DFMC

DFMC

Products Catalogue

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

Mine Dispatch System (MDS)

1. General Description

Mine Dispatch System (MDS) mainly monitors the position and working conditions of open-pit mining equipment around the clock (mainly trucks and shovels, drills, sprinkler, graders, bulldozers, fuel trucks). It can automatically adapt to the change of mining process and realize automatic optimization scheduling of trucks and shovels and mining equipment in real time to achieve the goal of optimizing production, increasing production, reducing fuel consumption, safe and effective management. The establishment of production monitoring, intelligent scheduling, production command management system completely changes the traditional production management mode, which is a revolution in the production management mode of open-pit mine.

2. System Features

4G LTE communication network: 4G LTE network has features of high rate and low delay. One network is enough to carry voice and data services. It uses QoS management mechanism to ensure network security and efficiency. It can effectively solve the problem of dead zone. It has good scalability which can access to voice and data system. DFMC is the first company in the world to apply the 4G LTE communication network to a dispatch system and apply it successfully.

Highly adaptable terminal: It can meet the requirements of the temperature range of -40-75°C in mining production. And it can work stably under strong vibration, strong electromagnetic and high dust environment. It has self-protective function for over-voltage, low-voltage, over-current and over-heat.

Advanced system software: It can realize fully automatic real-time optimization scheduling. The low-precision GPS module can be used to automatically determine the loading and unloading of the equipment. The production process does not require the driver to operate. Using high-precision GPS module can realize the automatic navigation, hole and depth detection of the drilling rig, realize bucket positioning and material quality control. It is a complete equipment maintenance management system, providing equipment operation charts and equipment information management.

3. System Applications

Ansteel Group's Qidashan Iron Mine, which is the first application of DFMC in 2002.

Shenhua Group's Shengli Coalfield No.1 Open Pit Mine, which is the first application to use Mesh Network in China.

China Coal Group's Pingshuo Antaibao Open-pit Coal Mine, which is one famous mine in China with 30 million tons production ability per year.

Shenhua Group Junger Energy Co., LTD's Heidaigou Open-pit Mine, which is the third largest coal mine in the world.

Shenhua Group Junger Energy Co., LTD's Halsu Open-pit Mine, which is the second largest coal mine in the world.

China Railway 7th&9th Bureau Conglomerate Company's SICOMINES Cu-Co Mine in Democratic Republic of the Congo, which is the first international project of the DFMC's MDS. It was implemented in 2015.

The Letpadaung Copper Mine in Myanmar, which is the world's first dispatching system project using 4G LTE network.

Inner Mongolia Huolin River Opencast Coal Industry Co., Ltd.'s South Open Coal Mine, which is one of China's five largest coal mines.

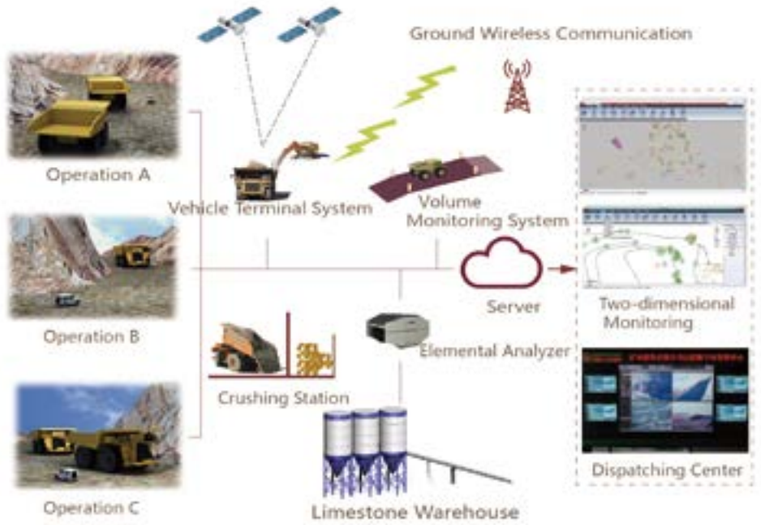
Limestone Batching System

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

China United Cement Taian Luohushan Limestone Mine: Implemented in 2015

Sichuan Esheng Quarry: Implemented in 2017

Yunnan Huaxin Zhaotong limestone Quarry: Implemented in 2017

Hainan Huasheng Cement Yanwoling limestone mine: Implemented in 2018

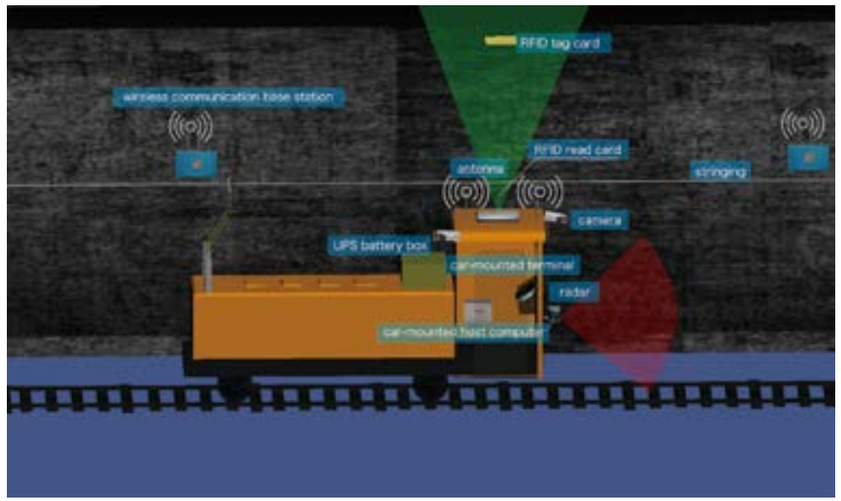
Conch Cement Digang: Implemented in 2018

Unmanned Driving System for Underground Mine

1. System Overview

Unmanned Driving System for Underground Mine connects and controls the block signal system and can input production plan, locomotive operating parameters, and height of the material in winzes, etc. into central system. The system can realize optimal dispatching, autonomous cruise, automatic loading and automatic unloading of electric locomotives, and ultimately achieve the goal of unmanned driving of electric locomotives.

The implementation of unmanned driving of electric locomotives can reduce transportation personnel at the same level, including underground locomotive drivers and winze ore drawing personnel. In over ground control room, one dispatcher can monitor the operation of 3-4 vehicles, which can improve production capacity and intrinsic safety level, and truly realize “Machinery and automation replace labor”.



2. System Functions

Unmanned Operating Control System

Vehicle-mounted controller controls vehicle-mounted frequency converter through MODBUS, and vehicle-mounted frequency converter directly controls the locomotive's motor, to realize vehicle's start, acceleration, uniform speed, deceleration and brake, and to control pneumatic brakes and lifting bows through solenoid valves.

Locomotive Precise Positioning System

Locomotive precise positioning system is one important condition for realizing driverless. Through the integration of various technologies, precise positioning of underground locomotives can be achieved. For example, the positioning of locomotives on key track nodes can be achieved through a narrow RF angle RFID orientation technology. Combined with the vehicle's own encoder positioning and orbital GIS distribution, 2cm accuracy of positioning can be achieved.

Network Communication System

Establish underground backbone networks, including optical fiber ring networks and wireless ad hoc networks, which is the foundation platform for underground mine information construction and can provide reliable, high-speed information channels.

Video Monitoring System

Video Monitoring System includes: vehicle-mounted video monitoring, loading point video monitoring, discharging station video monitoring, substation video monitoring, entrance on middle winzes video monitoring, common road segment video monitoring, and monitoring for other major areas. It can secure high-level safety of vehicle driving.

Variable Speed Cruise System

Realize locomotives' orbits and dispatching instructions self-adaption and autonomous adjustment of driving speed. Realize autonomous operation of underground locomotives. It can achieve the purpose of a single person managing the operation of multiple locomotives.

Automatic Loading System

When locomotive is approaching and the loading system has received loading instruction from dispatching center, the automatic loading system will automatically control the winze ore dumping machine, according to the adjustable ore-drawing parameters, to achieve automatic loading. There is no need of personnel to participate in the automatic loading process. The system will automatically detect the material level and control the locomotive to go forward and backward.

3. Application Case

Magang (Group) Holding Co., Ltd. Zhangzhuang Iron Mine Unmanned Driving System for Underground Mine: Started implementing in 2016.

West Mining Xitieshan Lead-Zinc Mine Underground Locomotive Unmanned Driving System: Implemented in 2018.

Manufacturing Execution System

1. System Overview

Manufacturing Execution System (MES) can realize the integration and connection of the business and control systems, coordinate the production of the upper and lower links and integrate the various business management. MES can provide real-time production data required for production management personnel at all levels, through intelligent analysis and tracking of production data, digging equipment and work potential constantly, to improve production efficiency and reduce production cost, and to improve the yield and reduce unplanned downtime, and to continuously improve management objectives and to achieve lean production.

2. System Functions

Process monitoring

The production configuration screen is released through web, breaking through the regional limit. Online real-time monitoring of plant major equipment operating parameters and operation status of important process flows, and integrated video monitoring signal. The visual picture expresses the field production process. Combined with real time database, the history replay function of configuration picture can be realized.

Production scheduling

Collect business data during the production process and monitor the production control process and equipment operation of each process. Automatic summarize statistics and generate scheduling report. Timely identify problems or potential problems in the production process. And coordinate maintenance and security apartments to solve problems and ensure that production is carried out in a safe, orderly, and smooth manner.

Production statistics

To store, count, and summarize professional data such as output, quality, equipment, materials, energy, etc. According to the statistics and analysis of departments and business, special statistical reports and trend charts can be formed. The effective and integrated display of useful information scattered in every link of production is carried out to realize the visualization of data.

Energy management

To realize the collection and management of energy information of various production plants, such as water, electricity, gas and coal. Through the collection and analysis of energy data, it shows the energy consumption process to help users to determine abnormal energy consumption. Instant alarm on abnormal energy consumption and abnormal equipment. After the digital instrumentation of the process is completed, the system has the ability to count single-machine energy consumption, accurately calculate equipment efficiency, and manage process energy consumption.

Security management

Through security monitoring, safety pre-warning, quality standardization, hidden danger investigation and follow-up processing, the system uses digital technology measures and process control to improve the quality of safety management and avoid accidents.

Equipment management

Through the management and information collection of equipment inspections, maintenance and repairs, etc. Regulate and supervise the day-to-day work of equipment management and record planned and unplanned production downtime events. Using statistics to form chart analysis results such as equipment running rate and failure rate. Through real-time storage of the key operating parameters of the device, it helps the users to trace the abnormal equipment and supervise the operation.

Quality management

Realize the management of important business processes such as quality inspection and testing in the production process. Collect, calculate and summarize quality data, and report alarms on abnormal data and alarm the key data abnormality to realize data statistics, analysis, publishing, sharing, and providing form printing function.

Material consumption

Integrate the material consumption data of the workshop, including raw materials, consumables, reagents, large spare parts and so on. Combined with budget management, the cost assessment of production units can be realized. According to all the materials of a workshop, single material can be viewed separately. At the same time, according to the needs of users, it can increase the business of fixed materials, spare parts recovery/disposal, etc.

3. Application Cases

China Railway Resources Yichun Luming Mining Co., Ltd.

China Gold Group Inner Mongolia Mining Wunutu Tushan Copper and Molybdenum Mine.

China Coal Pingshuo Coal Industry Limited Jinggong No.1 Mine.

Elemental Analyzer-Cement

1. Product Overview

Elemental analyzer (EA-Cement) 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

Prompt Gamma Neutron Activation analysis(PGNAA) Technology.

3. Product Features

- The unique measurement structure improves the detection efficiency.
- The high-performance detector and signal processing system improve the measurement performance of the product.
- The structure of multi-source and multi-detector can be adjusted flexibly to meet the needs of various site processes.
- A variety of specifications are available for site selection and can be designed for field measurement when there are special needs.

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	Cf-252					
Signal processing cabinet	Protection class: IP66 Dimension: 1100×770×300mm					
Working temperature	Working temperature of measuring device: -30℃ ~50℃					
Power supply	~220V±10% 50Hz/60Hz, 6.5A, 3–wire (L、N、GND)					
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, Cu, Ni, Ti, 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-Cement 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-Coal

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

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	Cf-252								
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	~220V±10% 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.								

Note: The size, color and weight are for reference.

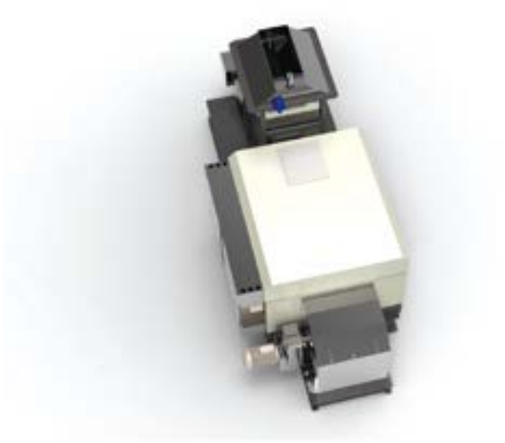
5. Product Application

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-Coal

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

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	5000mm
Total Width	2010mm
Total Height	2350mm
Radioactive Source	Cf-252 Neutron Source, Cs-137 Gamma Source
Normal Operating Temperature	-30℃ ~ 50℃
Power Supply	~220V,50Hz,6A,3-wire (L,N,GND) ~380V,50Hz 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.

Note: The size, color and weight are for reference.

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.

Elemental Analyzer-Sinter

1. Product Overview

Elemental analyzer (EA-Sinter) 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 TFe,CaO,SiO2 and other components in the material and calculates the alkalinity R. The sinter process is controlled according to the results of the analyzer online detection.Reduce the alkalinity fluctuation and improve the stability of alkalinity.

2. Product Principle

Prompt Gamma Neutron Activation analysis(PGNAA) Technology.

3. Product Features

- The unique measurement structure improves the detection efficiency;
- The high-performance detector and signal processing system improve the measurement performance ofthe product;
- The structure of multi-source and multi-detector can be adjusted flexibly to meet the needs of various site processes;
- A variety of specifcations are available for site selection and can be designed for feld measurement when there are special needs.

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	Cf-252					
Signal processing cabinet	Protection class: IP66 Dimension: 1100×770×300mm					
Working temperature	Working temperature of measuring device: -30℃ ~50℃					
Power supply	~220V±10% 50Hz/60Hz, 6.5A, 3-wire (L, N,GND)					
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,Cu,Ni,Ti,etc.					
Calculate quality parameters	Alkalinity R(Ca/Si)、TFe and and etc.					

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

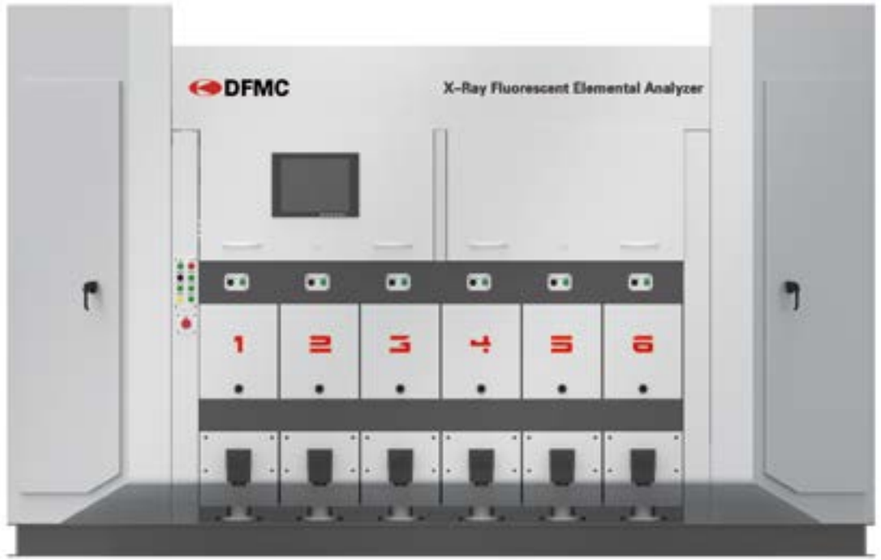
5. Product Application

The EA-Sinter can be used in I mixed process or II mixed process of the sinter plant.

XRF Elemental Analyzer-Multi

1. Product Overview

X-Ray Fluorescent Elemental Analyzer(XRF) is an online instrument for element analysis.XRF can simultaneously analyze multi element of multi slurry stream.XRF can be used for plant operation to minimize reagent consumption,maximize recoveries and increase throughput.



2. Principle of Analysis

Energy Dispersive X-ray Fluorescence, EDXRF.

3. Product Features

- No manual intervention from sampling to analysis.
- Each sample channel is separated and doesn't affect each other.
- Not affected by process factors such as concentration, particle size, bubble, velocity, stratification.
- No required radioactive sources permission.
- No required liquid nitrogen cooling.

4. Product Parameters

1) Instrument size:

Take 6-stream model as an example, the instrument dimensions (L×W×H): 4180x1650x2660mm;

the net weight of 6-stream X-ray fluorescent elemental analyzer:2450Kg;

2) Technical parameters:

- Up to 12 streams can be suited for different processing point;
- XRF is suitable for above 20th atomic number elemental analysis;
- Typical content is 100% -0.01%;
- Typical accuracy(RSD):high content is 1%-4%;low content is 3%-6%;extremely low content is 10%-20%;
- Analysis time of each flow channel is 1 minute,the time can be adjusted by customized;
- Typical cycle analysis time of 6 channels is 8 minutes;

3) Site condition

- Flow requirement: The optimal flow range for each set of analysis tanks: 5 to 10 m^3/h;
- Flush water requirements: living water, clean and no suspended particles; 0.3MPa <water pressure <0.8MPa;
- Power requirements: three-phase AC 380/460V, 50/60Hz. normal operating power is less than 4kW, ground wire to ground resistance is less than 4Ω; (Remarks: different motors are selected according to different three-phase alternating current.)
- Compressed air requirements: Air pressure requirements: 0.6MPa<Air pressure<0.8MPa;
- Temperature requirement: working stream temperature: 0°C~40°C; working environment temperature: -20°C~50°C; working environment humidity: 0%~90%;

5. Product Application

Widely used in non-ferrous, ferrous, metallurgical and other industries, it has played an important role in stabilizing and improving product quality, increasing metal recovery and saving costs.

XRF Elemental Analyzer-Single

1. Product Overview

X-Ray Fluorescent Elemental Analyzer(XRF-Single) is an online instrument for element analysis.XRF can simultaneously analyze multi element of single slurry stream.XRF can be used for plant operation to minimize reagent consumption,maximize recoveries and increase throughput.

2. Operating Principle

Energy Dispersive X-ray Fluorescence, EDXRF.

3. Product Features

- No manual intervention from sampling to analysis;
- Not affected by process factors such as concentration, particle size, bubble, velocity, stratification;
- No required radioactive sources permission;
- Installed directly on the process pipeline;
- No required liquid nitrogen cooling.

4. Product Parameters

1) Technical parameters

- XRF-Single is suitable for above 20th atomic number elemental analysis;
- Typical content is 100% -0.01%;
- Typical accuracy(RSD):high content is 1%-4%;low content is 3%-6%;extremely low content is 10%-20%;
- Analysis time is 1 minute,the time can be adjusted by customer;
- Instrument dimension is customized according to the condition at installing location.

2) Site Conditions

- Flush water requirements: living water, clean and no suspended particles; 0.3MPa <water pressure <0.8MPa;
- Compressed air requirements: Air pressure requirements: 0.6MPa<Air pressure<0.8MPa;
- Temperature requirement: working stream temperature: 0°C~40°C; working environment temperature: -20°C~50°C; working environment humidity: 0%~90%;
- Requirements for power supply: Power supply for the analyzer: three-phase AC 380/460V, normal operational power: below 2kW, max. Earth resistance of grounding conductor: <4Ω. (Remarks: different motors are selected according to different three-phase alternating current.)

5. Product Application

Widely used in non-ferrous, ferrous, metallurgical and other industries, it has played an important role in stabilizing and improving product quality, increasing metal recovery and saving costs.

XRF Elemental Analyzer-Solution

1. Product Overview

X-Ray Fluorescent Elemental Analyzer (XRF-Solution) is an online analyzer with single stream and can measure many elements. It can conduct online real-time analysis on element components within materials during industrial production process. The complicated and cumbersome sample processing is omitted, it analyzes and measures slurry directly and the analysis results are quickly given. It can participate and guide the automatic control of the production process.

2. Principle of Analysis

Energy Dispersive X-ray Fluorescence, EDXRF.

3. Product Features

- No manual intervention from sampling to analysis;
- Not affected by process factors such as concentration, particle size, bubble, velocity, stratification;
- No required radioactive sources permission;
- No required liquid nitrogen cooling.

4. Product Parameters

1) Technical parameters

- It is suitable for above 20th atomic number elemental analysis;
- Typical content is 100% -0.01%;
- Typical accuracy(RSD):high content is 1%-4%;low content is 3%-6%;extremely low content is 10%-20%;
- Analysis time is 1 minute,the time can be adjusted by customer;
- Instrument dimension is customized according to the condition at installing location.

2) Site conditions

- Flush water requirement: Domestic water. Clean. No suspended particle. 0.3MPa < water pressure < 0.8MPa.
- Supply requirement: Single phase AC 220V, 50Hz. Normal operation power is less than 3kW. Resistance to earth of earth wire < 4Ω.
- Compressed air requirements: Air pressure requirements: 0.6MPa<Air pressure<0.8MPa;
- Temperature requirement: working stream temperature: 0°C~40°C; working environment temperature: -20°C~50°C; working environment humidity: 0%~90%;

5. Product Application

Widely used in non-ferrous, ferrous, metallurgical and other industries, it has played an important role in stabilizing and improving product quality, increasing metal recovery and saving costs

Iron Slurry Grade Analyzer-D

1. Product Overview

Iron Slurry Grade Analyzer (IGA-D) is an instrument suitable for online real-time measurement of iron content in iron ore slurry. IGA-D has high detection accuracy, strong representativeness and can guide users to optimize production control through real-time detection, which improves product percent of pass and saves energy and reduces consumption.

2. Working Principle

Dual-energy γ-ray absorption technology.

3. Product Features

- Analysis time is 1s;
- No manual intervention from sampling to analysis.
- Auto-flushing device enables remote or local flushing of pipe, reducing the amount of work required to maintain the meter.
- It adopts highly sensitive and efficient scintillation detectors to reduce the dosage of radioactive source.

4. Product Parameters

- Dimensions and Weight of Instrument:

Equipment net weight (excluding IPC, sampler): 900kg

Equipment dimensions (length*width*height): 2200×1500×1700 mm

- Technical Parameter:

Detecting parameter: Iron grade

Measuring time: 1 second

Tested process type: Raw ore, concentrate, tailings.

Detection accuracy: Typical accuracy is 0.5(1σ). Specific situation is related to on-site process conditions.

- Working Condition:

Installation space requirement: No less than 2500*1500*2000mm

Flow requirement: 8-10 m^3/h

Grounding requirement: Grounding resistance < 4Ω

Power requirement: 220VAC±10%, 50Hz±5%, 2kW

Flushing water: Clean and without suspended particle. 0.3MPa < Water pressure < 0.5MPa

Air supply requirement: Clean and continuous air supply. 0.4MPa < Air pressure < 0.8MPa

5. Product Applications

- Suitable for online detection and analysis of iron content in the iron production process of steel enterprises.
- Improve iron content. Reduce silicon content. Improve product qualification rate.
- Provide an effective reference index for optimizing the control of production process to achieve the purpose of energy-saving and cost-reducing.

Iron Slurry Grade Analyzer-X

1. Product Overview

Iron Slurry Grade Analyzer (IGA-X) is an instrument suitable for online real-time measurement of iron content in iron ore slurry. IGA-X has high detection accuracy, strong representativeness and can guide users to optimize production control through real-time detection, which improves product percent of pass and saves energy and reduces consumption.

2. Product Principle

Energy Dispersive X-ray Fluorescence, EDXRF.

3. Product Features

- No manual intervention from sampling to analysis;
- No required radioactive sources permission;
- Not affected by process factors such as concentration, particle size, bubble, velocity, stratification.
- Lower maintenance;
- Convenient installation

4. Product Parameters

Parameter	Iron grade
Analysis tine	1min(Adjustable time)
Material	Raw ore,concentrate,tailing
Typical accurancy	Absolute error≤0.5%
Net weight	500Kg
Installation requirements	2300mm×2100mm×2700mm
Power supply	220VAC±10%, 50Hz±5%, 2KW
Flush water	0.4MPa-0.8MPa,living water
Compressed air	0.4MPa-0.8MPa,clean and Continuous
Sample material	8-10m³/h
Ambient humidity	≤95%, Non-condensing
Ambient temperature	-20℃ -45℃
Steam requirements	Continuous
Material concentration	10%-70%

5. Product Application

- Suitable for online detection and analysis of iron content in the iron production process.
- Improve iron content. Reduce silicon content. Improve product qualifcation rate.
- Provide an effective reference index for optimizing the control of production process to achieve the purpose of energy-saving and cost-reducing.

Ultrasonic Particle Size Analyzer

1. Product Overview

Ultrasonic Particle Size Analyzer(PSM) is an in-line analyzer for mineral slurries.It can provide accurate and real-time analysis which is suitable for measuring P80 particle size in the range of 25μm-295μm.PSM can be used for monitoring and optimizing system(expert system) to minimize reagent consumption,maximize recoveries and improve grinding performance.

2. Product Principle

Multi-frequency ultrasonic attenuation technology.

3. Product Features

- Overall samplers and analyzer solutions.
- 5 particle size fractions and 1 slurry concentration simultaneously.
- Eliminate bubbles in the slurry with S/C.
- Up to 3 streams can be suited for 3 different process slurries.

4. Product Parameters

1) Performance:

Number of streams	1~3
Measurable particle size range	Particle size ≤ 1mm; P80 from 25μm to 295μm
Typical accuracy	Absolute error ≤2.0% (1σ)
Measurable concentration range	Slurry concentration 4~60% w.t. (1-70% vol, related to the density of dry ore)
Data output	5 particle size fractions and 1 slurry concentration (each stream)
Communication	4~20mA or PROFIBUS Optional
Ambient temperature	-10 ~ +50℃
Protection level	IP54

2) Conditions need to be available at site

Installation requirements	3.5m * 2.8m horizontal base space, 2.5m vertical space, and can support the weight of the 1500kg.
Water	Clean water supply 2.5-3.0m³/h, intensity of pressure 350kPa-550kPa;
Power supply	380V AC; 50/60 Hz; 3 phases; 6kW;
Instrument air	clean and dry air supply, 0.1-0.15 m³/h, intensity of pressure 550kPa-700kPa;

5. Product Applications

The application fields of non-ferrous metal, ferrous metal and other metal grinding processes mainly include:

1) Iron ore, magnetite and other ferrous mines;

2) Gold, copper, molybdenum, lead and zinc mines and other non-ferrous mines;

3) Coal slurry, slag slurry and other non-metallic mineral processing.

Online Diameter-measuring Particle Size Analyzer

1. Product Overview

Particle Size Analyzer(PSI) is an online analyzer for mineral slurries without sampler.It can provide accurate and real-time analysis which is suitable for measuring particle size in the range of 20μm-1000μm.PSI can be used for monitoring and optimizing system(expert system) to minimize reagent consumption,maximize recoveries and improve grinding performance.

2. Product Principle

PSI uses a high-precision sensor to measure the size of randomly selected particles and converts singal by panel PC to calibrated percent readings passing the selected micron sizes.

3. Product Features

Directly installed on the pipe,no sampler required.

Simple and convenient maintenance.

Not affected by air bubbles,large particles and magnetic field.

The particle size range is measured from 20μm to 1000μm.

4. Product Parameters

Number of streams: 1	
Number of size fractions:≤2	
Measurable particle size range: 20μm-1000μm	
Pratical size interval per size fraction(%):	
Size fraction	Interval
μm: -75 ~ -850 mesh: 200 ~ 20	20 ~ 80
μm: -45 ~ -75 mesh: 325 ~ 200	30 ~ 70
μm: -25 ~ -45 mesh: 500 ~ 325	70 ~ 95
Typical accuracy: absolute error 1-2%(1σ)	
Communication: 4 ~ 20mA	
Protection level: detector: IP65; main control box: IP54	
Ambient temperature: 0 ~ +50℃	
Slurry temperature: 1 ~ 90℃	
Power supply: 220V AC, 50Hz, 50W	

5. Product Application

PSI can be used to analyze particle size of classifier overflow in mineral industry,e.g.Fe,Cu,Au,etc.

Ash Analyzer-B

1. Product Overview

Ash Analyzer (AA-B) is a kind of online coal ash measuring instrument developed by our company to meet the demands of clients and make up the shortcomings in traditional ash analysis, which can conduct rapid and accurate measurement on ash content of coal on the entire conveyer belt. It has such advantages as excellent stability, high measurement accuracy, easiness for installation and maintenance, etc. It saves the trivial processes of sampling, sample preparation, laboratory testing, etc., and no extra investment on factory building, etc. need to be input. It can be directly installed on the belt rack, without the need to make any alteration on the belt rack.

2. Operating Principle

Dual-energy gamma ray transmission technology.

3. Product Features

- **Real-time analysis:** The detection of the coal passing through the belt is totally real-time. The analyzer can give the instantaneous value and average of coal ash within any period according to the needs.
- **Representative measurement result:** The analyzer analyzes all the coal passing through the belt and overcomes the shortcomings of poor representativeness of the results of traditional assays, which only takes small portions for analysis.
- **Adaptability:** The analyzer uses the principle that signals can penetrate matter to achieve non-contact measurement.
- **Advanced:** The analyzer uses high-speed nuclear pulse signal processing to improve the dynamic response of the instrument.

4. Technical Parameters

- Measurement range:5%-50%
- IClean coal,RMSE≤0.5%,1σ

  Low ash raw coal,RMSE≤1.0%,1σ

  High ash raw coal,RMSE≤2.0%,1σ
- On-site ambient temperature range: -20C~45C;
- On-site ambient humidity range: ≤95%, non-condensing;
- Long-term stability: Measure a standard block continuously for 24 hours, the deviation of any “ten-minute ash content” measurement value from the average value is less than 0.5%;
- The dose equivalent rate at 1m from the instrument surface is ≤2.5μSv/h. During normal use of this instrument, it won’ t cause any damage to the operators.

5. Product Application

AA-B can be widely used in coal mines, coal washery, coal blending, coking plant, coal-fired power plants, steelworks, coal wharfs, etc. for online measurement; it can also be used for coal preparation, coal blending process to automatically adjust and control the production process.

Ash Analyzer-C

1. Product Overview

Ash Analyzer (AA-C) is an offline analytical instrument for rapid and accurate analysis of coal sample ash content in industrial processes. The analyzer can directly measure the collected coal samples while meeting the particle size requirements. The measuring speed is fast, the representative of the results is good, and it has a very strong guiding significance for actual production.

2. Operating Principle

Dual-energy gamma-ray absorption.

3. Product Characteristics

- Big analysable sample size, the measurement results are representative;
- high accuracy, repeated measurement of good repeatability;
- simple procedures to reduce the labor intensity of workers and skills requirements;
- Non-contact measurement, the key components are not easily damaged;
- Small size, excellent safety performance.

4. Technical Parameters

- Measurement range: 5%~50%
- Measurement accuracy:
  Clean coal,RMSE≤0.5%,1σ
  Low ash raw coal,RMSE≤1.0%,1σ
  High ash raw coal,RMSE≤1.5%,1σ
- Typical measuring time: 3~5min
- Sample box volume: 6L
- On-site ambient temperature range: 0~45℃
- On-site ambient humidity range: ≤95%, non-condensing
- Repeatability: The root mean square error of the same sample is less than 0.2%
- Long-term stability: Measure a standard block continuously for 24 hours, the deviation of any “ten-minute ash content” measurement value from the average value is less than 0.5%;
- Radiation safety: Dose equivalent rate at 5cm from the instrument surface is ≤2.5μ Sv/h, and that at 1m from the instrument is ≤0.25μ Sv/h. It has no limitation on personnel range of activity. Normal use of this instrument will not cause any damage to the operators.

5. Product Application

AA-C can be widely used in coal mines, coal washery, coking plant, coal-fired power plants, steelworks, coal wharfs, etc.

Ash Analyzer-E

1. Product Overview

Ash Analyzer (AA-E) can be installed directly on the belt sampler and can online test the coal ash on the sampler.

2. Product Principle

The product combines the principle of X-ray fluorescence and X-ray absorption. Applying X-ray exposure to the coal sample, the intensity of the different energies will be measured, and the coal ash value was calculated through data analysis and processing.

3. Product Parameters

Measurement accuracy

- Ash content<15%,RMSE≤0.5%,1σ
- Ash content15%-30%,RMSE≤1.0%,1σ
- Ash content>30%,RMSE≤1.5%,1σ

Operating environment

- Ambient temperature: -20℃ ~ 50℃
- Relative humidity: ≤90%, non-condensing
- Power supply: three-phase AC 380V, 50 Hz, grounding resistance < 4Ω

4. Product Features

- No radioactive pollution.
- Not affected by coal particle size and density.
- Real-time online nondestructive testing of coal ash.
- Non-contact measurement.

5. Product Applications

AA-E can be widely used in coal mines, coal washery, coal blending plant, coking plant, coal-fired power plants, steelworks, coal wharfs, etc.

Ash Analyzer-D

1. Product Overview

Multi-Detector Ash Analyzer (AA-D) is an online measuring instrument that can continuously detect ash in coal at different locations on the belt. Different from the traditional "single source with single detector" measurement method, by arranging multiple detectors above the belt conveyor, the ash measurement at multiple locations on the cross-section of the belt conveyor can be realized. Therefore, the test result of the analyzer is more representative. The use of multiple detectors can eliminate some "random errors" of the entire analyzer which may affect the detection results. And the accuracy of the detection results is better. Meanwhile, the use of multiple detectors can also effectively reduce the influences to detection result caused by the uneven distribution of steel chord in belt conveyor and belt deviation. Thus, the instrument is more applicable at site. For its superior detection performance and site adaptability, AA-D can be widely applied in sites such as coal mining, processing and comprehensive utilization that require fast and accurate measurement of coal ash.

2. Product Principle

Dual-energy gamma ray transmission technology.

3. Product Parameters

- Measurement accuracy: Ash content<15%,RMSE≤0.3%,1σ
  Ash content<30%,RMSE≤0.7%,1σ
  Ash content<50%,RMSE≤1.0%,1σ
- Measurement points: ≥3 points
- On-site ambient temperature range: -20℃ ~ 45℃
- On-site ambient humidity range: ≤95%, Non-condensing
- Radiation safety: The dose equivalent rate at 1m from the instrument surface is ≤2.5μSv/h. Normal use of this instrument will not cause any damage to the operators.

4. Product Features

- Better representativeness. The measurement result is more closed to the real situation of the whole coal flow.
- Better measurement efficiency. The exact measurement result can be given in short time.
- More adaptable at site. Effectively reduce the influence of unfavorable conditions such as particle size fluctuations and belt runaway.
- Through the coal quantity monitoring results, weighted average can be achieved to obtain more accurate detection results.

5. Product Applications

- Online detection of coal ash fluctuations in real time.
- The test results can be used for guiding the coal preparation and coal blending production and can participate in the production of automatic control.

Ash Analyzer-A

1. Product Overview

Ash Analyzer (AA-A) is a real-time online measurement on ash content in coal by detecting radiation emitted by natural radioactive materials contained in coal. Thus, AA-N is radiationless instrument.

2. Product Principle

AA-A measures ash content through the ray emitted by the natural radioactive material exists within coal. In the coal ray particles number and its total ash content have positive correlation. Therefore, by measuring the particle number of ray emitted by coal ore and total amount of coal ore, the ash content in coal can be calculated.

3. Product Parameters

Lifetime	≥10
Weight	≤4t
Size	Length: 4000mm, width: belt support width +400mm, height: belt support height+600mm
Power source	AC220V, ≤2000W
Communication interface	Ethernet/Modbus, RS232/485/Modbus, 4~20mA analog (optional)
Data output	Ash content value
Measuring accuracy	Clean coal (ash content ＜ 15%) ⩽ 0.5%，1σ
	Low-ash raw coal (ash content ＜ 30%) ≤1.0%, 1σ
	High-ash raw coal (ash content ⩾ 30%) ≤2.0%, 1σ
Optional part	4~20mA

4. Product Features

- Non-radioactive: The instrument doesn’t generate any high energy ray, which is easy for management, safe and reliable;
- Real time, online measurement: Gives out measuring result timely, guiding production in real-time;
- Full section measurement: High sampling representativeness, the results are stable, reliable and with high credibility;
- Static calibration: The process of calibration is simple, easy for sampling, not much workload;
- Strong adaptability of coal type: It can select special mathematical physical model according to the characteristic ray of different coal type, so that the instrument can have better adaptability of coal type change;
- Simple installation, not much workload for maintenance.

5. Product Applications

It can be used in the measurement of coming coal in power plant, raw coal in coal dressing plant.

Ash Moisture Analyzer-A

1. Product Overview

Ash Moisture Analyzer (AMA-A) is a safe and reliable online analytical instrument with distinguished performance. It can be applied to the real-time online measurement on ash content in coal. Thus, the instrument contains no radioactive substance itself, it doesn't emit radioactive ray and is radiationless, safe and reliable. It can give analysis result in real-time and instruct production.

2. Product Principles

AMA-A measures ash content through the ray emitted by the natural radioactive material exists within coal and measures moisture through microwave transmission method.

3. Product Features

- Non-radioactive: The instrument doesn't generate any high energy ray, which doesn't have radioactive security problems, safe and reliable;
- Real time, online measurement: Gives out measuring result timely, guiding production in real time;
- Full section measurement: High sampling representativeness, the results are stable, reliable and with high credibility;
- Static calibration: The process of static calibration is simple, easy for sampling, not much workload;
- Strong adaptability: It can select special mathematical physical model according to the characteristic ray of different coal types;
- Doesn't influenced by the steel chord in belt;
- Simple installation, not much workload for maintenance and even hardly need maintenance.

4. Product Parameters

Weight	≤4t		
Size	Length: 4000mm, width: belt support width+400mm, height: belt support height+600mm		
Power source	Input voltage: ~220V±2V, 50±1Hz. Power consumption electric power: 2000W		
Communication interface	Ethernet /Modbus, RS232/485/Modbus, 4~20mA analog (optional)		
Data output	Ash content value, moisture value and calorific value		
Measuring accuracy	Ash content	Clean coal	≤0.5%, 1σ
		Low-ash raw coal	≤1.0%, 1σ
		High-ash raw coal	≤2.0%, 1σ
	Moisture	5%~10%	≤0.5%, 1σ
		10%~20%	≤1.5%, 1σ
		Higher than 20%	≤2.0%, 1σ
	Calorific value	Clean coal	≤100kcal/kg
		Low-ash raw coal	≤150kcal/kg
		High-ash raw coal	≤200kcal/kg
Optional part	4~20mA Analog output module		

5. Product Application

It can be used in the measurement of coming coal in power plant, raw coal in coal dressing plant and coal into furnace in coal washing plant.

Ash Moisture Analyzer-B

1. Produce Overview

The Ash Moisture Analyzer (AMA-B) independently developed by DFMC is directly installed on the coal conveyor belt and directly performs online detection of the whole coal flow, avoiding the problem of poor sampling representativeness. It can be widely used in coal mines, thermal power plants, coal washery, coal blending plants and coal wharfs for online detection, and can also be used for automatic adjustment and control of the production process in coal preparation and coal blending processes.

2. Product Principles

- Ash measured by dual energy γ-ray transmission
- Moisture measured by microwave transmission
- Calorific value calculated by ash & moisture value

3. Product Parameters

- Accuracy

Clean coal	≤0.5%, 1σ
Raw coal with low ash content	≤1.0%, 1σ
Raw coal with high ash content	≤2.0%, 1σ

- Accuracy of moisture measurement

5%~10%	≤0.5%, 1σ
10%~20%	≤1.5%, 1σ
More than 20%	≤2.0%, 1σ

- Calorific value reference accuracy

(specific accuracy is given based on site conditions)

Clean coal	≤100kcal/kg, 1σ
Raw coal with low ash content	≤150kcal/kg, 1σ
Raw coal with high ash content	≤200kcal/kg, 1σ

4. Product Features

- Real-time analysis: The detection of the coal passing through the belt is totally real-time. The analyzer can give the instantaneous value and average of coal ash within any period according to the needs.
- Representative measurement result: The analyzer analyzes all the coal passing through the belt and overcomes the shortcomings of poor representativeness of the results of traditional assays, which only takes small portions for analysis.
- Adaptability: The analyzer uses the principle that signals can penetrate matter to achieve non-contact measurement. Customize best proposal according to the site condition, all key parts are designed indepently to ensure stable and reliable operation.

5. Product Application

AMA-B can be widely used in coal mines, coal washery, coal blending, coking plant, coalfired power plants, steelworks, coal wharfs, etc. for online measurement; it can also be used for coal preparation, coal blending process to automatically adjust and control the production process.

Ash Moisture Analyzer-D

1. Product Overview

Ash Moisture Analyzer (AMA-D) is an analytical instrument applied in coal industry site which measures the ash and moisture content in the initial-processing coal sample rapidly and accurately. The instrument has several characteristics, like rapid measurement, good representativeness and easy operation; it fits the field which has higher requirements for sample results timeliness well.

2. Product Principles

- Ash measured by dual energy γ-ray transmission
- Moisture measured by microwave transmission
- Calorific value calculated by ash & moisture value

3. Product Parameters

- Ash content measuring accuracy

Clean coal	≤0.5%, 1σ
Low-ash raw coal	≤1.0%, 1σ
High-ash raw coal	≤1.5%, 1σ

- Moisture measuring accuracy

5%~10%	≤0.5%, 1σ
10%~20%	≤1.5%, 1σ
Higher than 20%	≤2.0%, 1σ

- Calorific value referential accuracy (concrete accuracy will be given according to site conditions)

Clean coal	≤100kcal/kg, 1σ
Low-ash raw coal	≤150kcal/kg, 1σ
High-ash raw coal	≤200kcal/kg, 1σ

- Measurement stability

Measure a standard block continuously for 24 hours, the deviation of any “ten-minute ash content” measurement value from the average value is less than 0.5%;

- Sample measurement capability

Maximum weight of single sample: 5kg; maximum particle size of sample: 13mm

- Sample measurement time

The measurement time of moisture is ≤180s,and the measurement time of ash content is ≤10min,and the measurement time of ash content can be selected according to the needs of 200s, 400s, 600s and so on.

- Working power

Voltage: 220VAC, 50Hz; Power: 2000VA; Others: The equipment is equipped with an independent power conditioner

- Working environment

On-site ambient temperature range: 5-45°C

On-site environmental humidity range: ≤95%, non-condensing

- Radiation safety

Dose equivalent rate at 5cm from the instrument surface is ≤2.5μ Sv/h, and that at 1m from the instrument is ≤0.25μ Sv/h. It has no limitation on personnel range of activity. Normal use of this instrument will not cause any damage to the operators.

4. Product Features

- Fast analysis, high measurement accuracy, and representative results.
- Integrated design, automatic control process, and easy operation.
- Ash analysis using advanced multi-channel analysis technology, high-precision measurement, which reduces the effect of materials and site on measurement.
- Easy to operate, flexible and intuitional.
- The measurement results can be printed to ensure the authenticity of the data.

5. Product Applications

- Rapid detection of ash and moisture in power plant incoming coal and coal into furnace.
- Rapid detection of coal ash and moisture in steel and metallurgy, chemical and other industries.

Microwave Moisture Analyzer

1. Product Overview

Microwave Moisture Analyzer (MA) is a new kind of non-contact online moisture detection equipment, which can accurately measure the moisture content variation of the material.

MA I is mainly used for real-time online moisture detection of bulk materials transported on belt.

MA Ⅱ is a kind of online measuring equipment for the moisture content of the materials in boxes, which is suitable for the real-time online moisture detection of the materials in boxes transported by belt or roller.

MA III can be designed to meet the requirements of different process detection through different holders and can be embedded into the system equipment or integrated into the specific process flow.

MA I Microwave Moisture Analyzer

MA Ⅱ Microwave Moisture Analyzer

MA III Microwave Moisture Analyzer

2. Product Principle

The moisture content is calculated by detecting the power attenuation and phase shift of the microwave.

3. Product Features

- Non-contact measurement: without abrasion and interference, less maintenance amount.
- Measure total moisture: Penetrating material and representativeness is better.
- High anti-interference ability: without interference of environment dust, steam and vibration.
- Not affected by material color, temperature and particle size.
- Rapid and real-time measurement results: the sampling rate can reach to the microsecond level.
- Wide range of applications: almost all (non-conducting) substances.
- High security: Low emission energy, without radioactive nuclear sources.

4. Technical Parameters

Model	MA I	MA Ⅱ	MA III
Accuracy	0.5%~1% (1σ)	0.3% ~ 1% (1σ)	0.5%~1% (1σ)
Display mode of measurement result	Moisture content value (in percentage)		
Response time	≥1s (settable)	Corresponding to each box	≥1s (settable)
Analog output	4~20mA		
Ambient temperature	–20℃ ~+50℃		
Level of Protection	IP65		
Power supply	220V AC ±10%, 50/60Hz		
Power consumption	50W		
Display	5.7 inch 640*480 graphical dot-matrix, 65K TFT touch control LCD screen (Integrated on the host)		

5. Product Applications

MA applies to a diverse range of materials, such as online moisture detection in coal, timber, sugar, bagasse, sand, chemical products, etc non-conductive.

- Common materials: coal, fertilizer, sand, etc.
- Textile industry: fiber bundles, cotton bags, etc.
- Grain: wheat, rice, grain, corn, sorghum, grain, field crop, feed, etc.
- Bio-fuels: bagasse, wood dust, wood chips, sawdust, etc.

Ultrasonic (Slurry) Concentration Meter

1. Product Overview

Ultrasonic (Slurry) Concentration Meter (CM-U) is an online slurry concentration/density detection instrument. CM has the advantages of no radiation pollution, high precision, strong adaptability, good reliability, convenient installation.

2. Product Principle

Ultrasonic attenuation technology.

3. Product Features

- Selectable concentration or density depend on site's requirements.
- Detectable concentration range from 0 to 65%.
- Selectable pipe diameter from 50mm to 900mm.
- No radiative pollution.

4. Product Parameters

Performance

Accuracy	2% (1σ)
Resolution	0.5%
Measuring range	0%-65%

Output

Analog output	
Signal	4~20mA
Relay output	120mA, 350VAC

Ambient condition

Ambient temperature	0~+60℃
Ambient humidity	0~98% Relative humidity (no condensation)

Protection Level

Transmitter	IP65
Sensor	IP68

Medium condition

Process pressure	≤0.5MPa
Medium temperature	0~+60℃

Power source

AC type	220V AC ±15%, 50/60Hz, 10W

5. Product Application

- Online detection of slurry concentration, coal slime concentration and mortar concentration in metallurgical, coal washing, power plants and other industries;
- Tailings backfill concentration measurement in extractive industry.

Na22 Concentration(Density) Meter

1. Product Overview

Na22 concentration(density) Meter (CM-N) is an online slurry concentration/density detection instrument. CM-Na22 has the advantages of less radiation pollution, high precision, strong adaptability, good reliability, convenient installation.

2. Product Principle

Gamma ray generated by Na 22 source pass through the measured slurry.A part of the gamma ray is blocked by the material, and other part of the gamma ray is received by the detector. The concentration meter analyzes the gamma ray by received to calculate concentration/desity of slurry.

3. Product Features

- Source activity≤1×10E6 Bq,no permit required;
- Selectable concentration or density depond on site's requirements;
- Not affected by material flow rate,material temperature;
- Non-contact measurement;
- Lower maintenance;
- Convenient installation;

.

4. Product Parameters

Net weight	20Kg
Installation requirements	500mm×600mm×500mm
Power supply	220VAC±10%, 50Hz±5%, ≤0.5KW
Ambient temperature	–20℃ –45℃
Ambient humidity	≤95%, Non-condensing
Steam requirements	Continuous
Pipe diameter	DN80 – DN300
Typical accurancy	Absolute error≤1%

5. Product Application

CM-N is applied to online analyze various of liquid concentrations/density in the metallurgy,mining industries.

Radar Level Meter

1. Product Overview

Radar Level Meter (LM) is an online level detection instrument, which can measure the material level in bunker or silo.LM is not affected by dust, noise of feeding, and airflow or temperature changes. It is the best choice in some extreme conditions.

2. Product Principle

FM Continuous Wave (FMCW) .

3. Product Features

- Better representation using large beam angle technology.
- Multiple detection mode(Highest,lowest,average,etc).
- Suitable for dust, water vapor and other harsh conditions.
- Interference suppression technology to Solve feeding complex disturbance problem.

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, Relayout 400VAC 150mA
- 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

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

2) Mineral processing industry

crushing surge bin, grinding & dressing bin, feeding bin, etc.

3) Coal industry

raw coal bunker, washing coal bunker, fine coal bunker, etc.

4) Power industry

raw coal bunker, pulverized coal bunker, limestone bunker, etc.

Neutron Ambient Dose Equivalent Meter

1. Product Overview

Neutron Ambient Dose Equivalent 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.

Automatic Balling Feeder

1. Product Overview

Automatic balling feeder is a equipment that can automatically feed ball into the SAG,ball mill or other mill. The quantity of ball can be defined by manned or control system.

2. Product Principle

The automatic balling feeder uses a programmable logic controller, which can adjust the amount of adding ball and the way of adding ball according to the needs of the ball mill operation. Under the drive of the motor and the reducer, the sprocket drives the ball claw to lift the steel ball in the ball box to the outlet and add it to the ball mill. When the steel ball passes through the counter plate, the count switch produces a pulse signal and the system automatically records the signal.

3. Product Features

- Switch from manually adding ball to automatically adding ball;
- A certain amount of steel balls can be added at one time according to the demand;
- According to the demand, a certain amount of steel ball can be added after a certain time interval;
- The ball can be added according to the ball consumption, which is in accordance with the ore amount that entering the ball mill;
- Record the amount of added steel ball and show the statistics of the amount of added ball;
- There are no-ball alarm, fault alarm, network communication and other functions.
- Touch screen operation is simple and convenient.

4. Product Parameters

1) Automatic Balling Feeder Dimension

Control Cabinet Size: 1200X600X400mm(H*W*D)

Balling Feeder Size:

Balling Feeder Size	Self-weight	Capacity of Ball
2600mm*1200mm*1800mm	1.5t	5t
2400mm*1100mm*1600mm	1.3t	4t
2400mm*1000mm*1500mm	1.2t	3t
2200mm*900mm*1500mm	1.0t	2t

2) Motor Power

Motor power: 2.2KW (Suitable for steel balls with diameter: Φ150-Φ180)
1.5KW (Suitable for steel balls with diameter: Φ20-Φ120 and cylpeb)

Vibration Motor: 1.1KW (Suitable for steel balls with diameter: Φ150-Φ180)
0.75KW (Suitable for steel balls with diameter: Φ20-Φ120 and cylpeb)

3) Ball-adding Speed

Ball-adding speed: 1-600 balls/h (Steel ball diameter: Φ80-Φ180)
1-3000 balls/h (Steel ball diameter:Φ20-Φ60 and cylpeb)

4) Power Supply

Motor power supply: AC380V, 50Hz

Control cabinet power supply: AC220V, 50Hz

Touch screen and controller power supply: DC24V

(The power supply demand of the balling feeder can be modified according to the power supply standard in the area where the user is located)

5) Controller and man-machine interface

The German SIEMENS S7-1200 series PLC is used as the controller and the TP900 touch screen is used to display and operate. With data transmission functions, data can be transmitted to the factory control system.

5. Product Application

This product is suitable for balling control for semi-autogenous mill and ball mill ball control.

DFMC

Dandong Dongfang Measurement & Control Technology Co.,Ltd.

Address：No.136 Binjiang M. Road, Yanjiang Development Zone,

Dandong,Liaoning, China

Tel: 86-415-3862214

E-mail: intersales@dfmc.cc

Fax: 86-415-3862272

Website: http://en.dfmc.cc