HOT

Process For Environment

Intelligent Magnetite Feeding System

In Coal Preparation Plant

HOT (Chengdu) Industries Co., Ltd

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01 Overview

1. System Overview
- Evolution of Intelligent Management System

- New technologies such as "cloud, big data, Internet of Things, mobile internet, and artificial intelligence" are constantly being implemented and matured;
- Mining automation and basic information systems are becoming increasingly complete;
- Mining production will enter a new intelligent era of safety, green, and efficiency.

Intelligent

Lean Production

Visualization

Integrated

Manual

- Manual mining
- Manual inspection
- Manual recording
- Manual control

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Industrial Automation

- Mining mechanization
- Automation of sensors and instruments
- Centralized system, DCS system

………

Informationalization

Various business systems
MES, ERP, financial systems, etc
Various security systems
For personnel, equipment, gas, pressure, etc

………

Intelligent production and operation

Cloud computing
Big data
IoT
Mobile Internet
Intelligent analysis Intelligent decision-making

2. System Overview

- We face challenges in various aspects such as safety, environmental protection, and operational management.

➢ **The strict situation of production safety**

The special production environment and equipment of mines lack effective management methods, leading to frequent occurrences of gas, water permeability, and roof disasters and accidents in coal mines.

➢ **The workforce is seriously fragmented**

As a high-risk and high-intensity industry, the mining sector faces challenges in recruiting technical talent, and the aging trend among its workforce continues to worsen.

➢ **The efficiency of production management needs to be improved, and operational costs are high**

Many companies prioritize investments in production equipment while allocating fewer resources to overall business operations and management, resulting in low mining management efficiency and high operational costs.

➢ **The management of mining areas is complex**

Many mining companies often involve large corporate campuses, encompassing a significant number of equipment, systems, resources, and personnel, making the management of human, financial, and material resources challenging.

3.System Overview-What are the problems we are facing?

- In coal preparation plants, the manual addition of dense medium is common, leading to low work efficiency and insufficient precision;

- The workers face high labor intensity and operational risks;

- Remote control is relatively difficult, and the existing control method cannot meet the requirements of automation and intelligent production;

- The data statistics are challenging, making it difficult to calculate the data accurately.

- The intelligent system can achieve the manual, automatic, and intelligent modes of the magnetite feeding;

- It can be remotely controlled, collect feeding and proportioning data, generate data analysis results, provide production guidance, and simultaneously improve production efficiency.
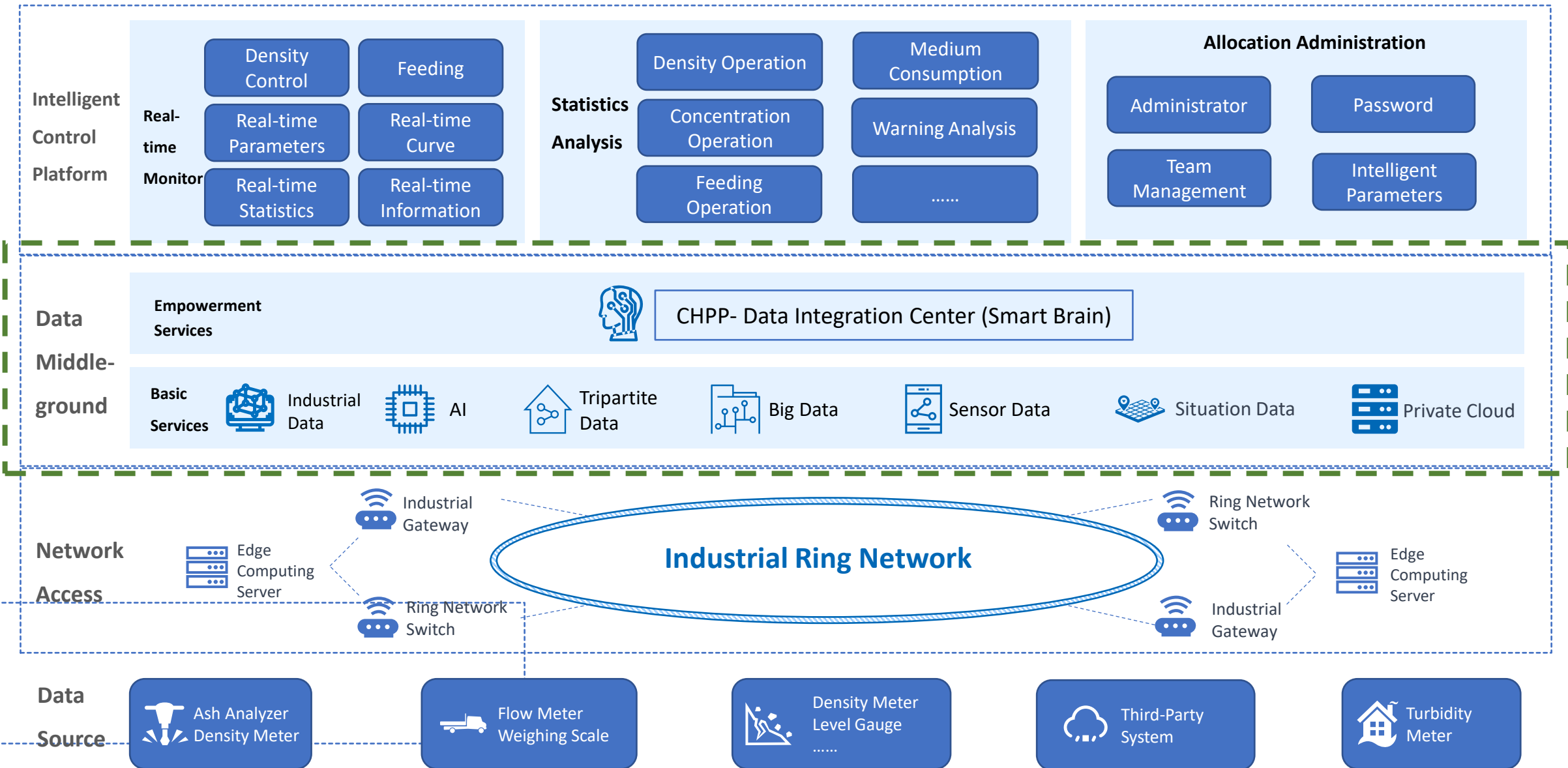
5. System Overview- Introduction of Magnetite Feeding Module

The intelligent magnetite feeding system uses key instruments like 3D level laser radar, measurement software, and an intelligent control system, along with a self-developed software platform, to optimize the additive process. It enables precise monitoring of critical data and achieves functions like 3D automatic measurement of powdered materials, automatic retrieval and measurement of powder, automated ratio control, and automatic delivery. This system fulfills the goal of intelligent magnetite feeding technology.
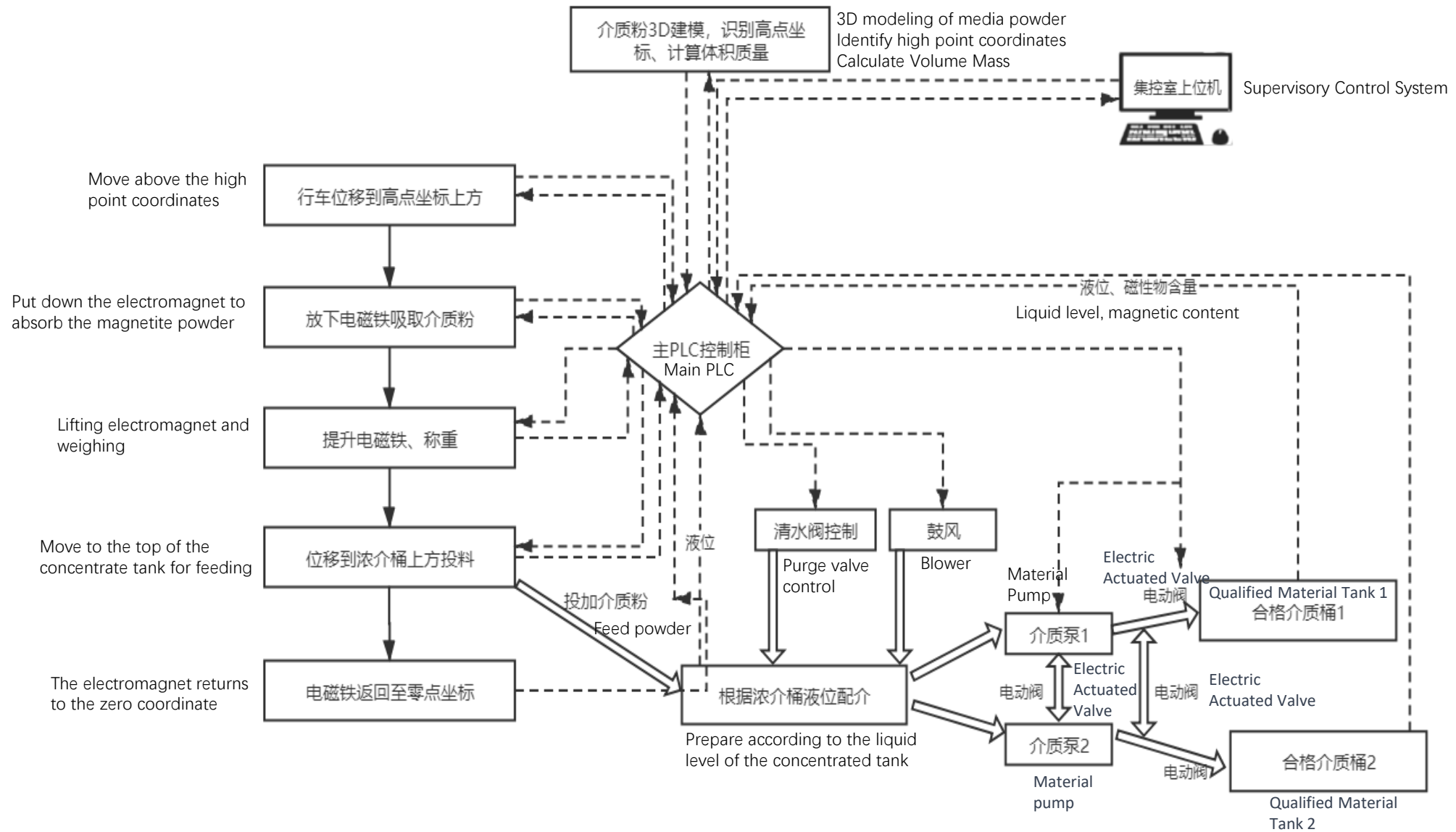
02 Purpose of System Establishment

1.Our Goal

◆ Automated Magnetite Feeding Control: By centrally managing equipment, it automates the additive process, replacing manual operations, and enhances efficiency.

◆ Equipment Modification: Installation of sensors enables automatic water addition, locking, and optimization of additive control.

◆ Intelligent Control: Utilizing 3D laser radar for precise control of material powder suction, improving additive efficiency.

◆ Weight Recording: Records the weight of each material powder suction, generates consumption data, and provides accurate information.

◆ Inventory Management: Calculates material inventory, issues real-time low inventory warnings, ensuring production continuity.

◆ Data Statistics and Display: Generates production statistics, displays consumption trends, and assists in decision-making.

◆ Intelligent Alerts and Safety: The system provides audio-visual alerts and intelligent video monitoring to ensure operational safety.

◆ Remote and On-Site Control: Supports both remote and on-site control, ensuring stable production operations

03 System Structure

介质粉3D建模，识别高点坐标、计算体积质量
3D modeling of media powder
Identify high point coordinates
Calculate Volume Mass

集控室上位机 Supervisory Control System

Move above the high point coordinates
行车位移到高点坐标上方

Put down the electromagnet to absorb the magnetite powder
放下电磁铁吸取介质粉

Lifting electromagnet and weighing
提升电磁铁、称重

Move to the top of the concentrate tank for feeding
位移到浓介桶上方投料

The electromagnet returns to the zero coordinate
电磁铁返回至零点坐标

主PLC控制柜 Main PLC

液位、磁性物含量
Liquid level, magnetic content

液位

清水阀控制 Purge valve control

鼓风 Blower

投加介质粉 Feed powder

根据浓介桶液位配介
Prepare according to the liquid level of the concentrated tank

介质泵1 Material Pump

介质泵2 Material pump

Qualified Material Tank 1 合格介质桶1

合格介质桶2 Qualified Material Tank 2

Electric Actuated Valve 电动阀

电动阀 Electric Actuated Valve

电动阀 Electric Actuated Valve

电动阀 Electric Actuated Valve

1.Manual Mode:
Centralized Control Room Configuration Software: Input material quantity or frequency, control cart positioning, retrieval, unloading, and weigh material powder.
Valve Control: Interface for valve control, displaying water supply and air valve statuses.
On-Site Control: Remote control for cart and pump operations available for on-site use.

2.Automated Cycling Mode:
Process Breakdown: Divided into three steps - material preparation, aeration, and material conveying. Controlled through the main touchscreen interface.
One-Click Operation: Press a button to automatically complete the entire process.

3.Fully Automated Mode:
One-Click Additive: Configure the interface button to execute material preparation, aeration, and material conveying processes based on the set density.
Intelligent Decision-Making: If additive is not required, the automatic additive process is skipped.

3.Control Flow

1. Positioning Control: It uses encoders for positioning, and 3D radar determines the material high point. Electromagnets move automatically.
2. Magnetite Powder Feeding: Weighing sensors on the electromagnets measure and stop material retrieval when the preset value is reached. The material is then fed to the concentrated tank.
3. Aeration and Water Flush: Electromagnetic valves automatically control the aeration and water flush quantities, with remote, timed, and automatic control.
4. Centralized Control Automatic Settings:
5. Automatic Material Retrieval: Guided by 3D laser radar, electromagnets retrieve material automatically.
6. Density Control: Real-time monitoring, automatic material replenishment to maintain the preset density.
7. Flush Control: Hydraulic valves and flow meters control, automatically forming the material liquid.
8. Data Analysis: Records shift-wise feeding data, inventory, etc., and generates statistical data.
9. Real-time Upload: Information is transmitted to the control room computer for real-time display and analysis.

04 Interface Display

1. Settings Interface

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admin
2023/08/24 星期四

数据可视化

数据查看

系统配置

参数配置

帮助

在线文档

设定加介量	0T	保存
设定密度	0Kg/L	保存
密度计校正	1Kg/L	保存
液位计校正	1.67m	保存
抓钩标定	标定	
小车标定	标定	
大车标定	标定	
取料标定	标定	
倒料标定	标定	
待料标定	标定	
抓钩上到位坐标	标定	

2. Data Viewing Interface