中国五矿 | MCC 中国恩菲

恩菲电气智能技术公司

ENFI Electrical Intelligent Technology Company

点资源之石 · 成事业之金

中国五矿

中国恩菲

CONTENTS
目录

一、中国恩菲工程技术有限公司 01
China ENFI Engineering Corporation

1. 简介
The Brief Introduction
2. 资质
Qualification

二、恩菲电气智能技术公司 02
ENFI Electrical Intelligent Technology Company

1. 恩菲电气智能技术公司
ENFI Electrical Intelligent Technology Company
2. 恩菲洛阳电气智能分公司
China ENFI Luoyang Electric Intelligent Branch

三、人才优势 03
Talent Advantage

四、专长技术 04
Expertise Technology

1. 专长技术
Specialty Technical
2. 专利技术
Patent Technology
3. 自动化和新能源奖项概览
Overview of Prizes Awarded for Achievements in Automation and New Energy
4. 课题及实验室
Project and laboratory

五、业务概览 08
Main Business

1. 智能化、自动化工程
Intelligence and Automation Engineering Project
2. 电力及能源工程
Power and Energy Project
3. 信息及软件集成
Information and Software Integration
4. 核心装备
Core Equipment

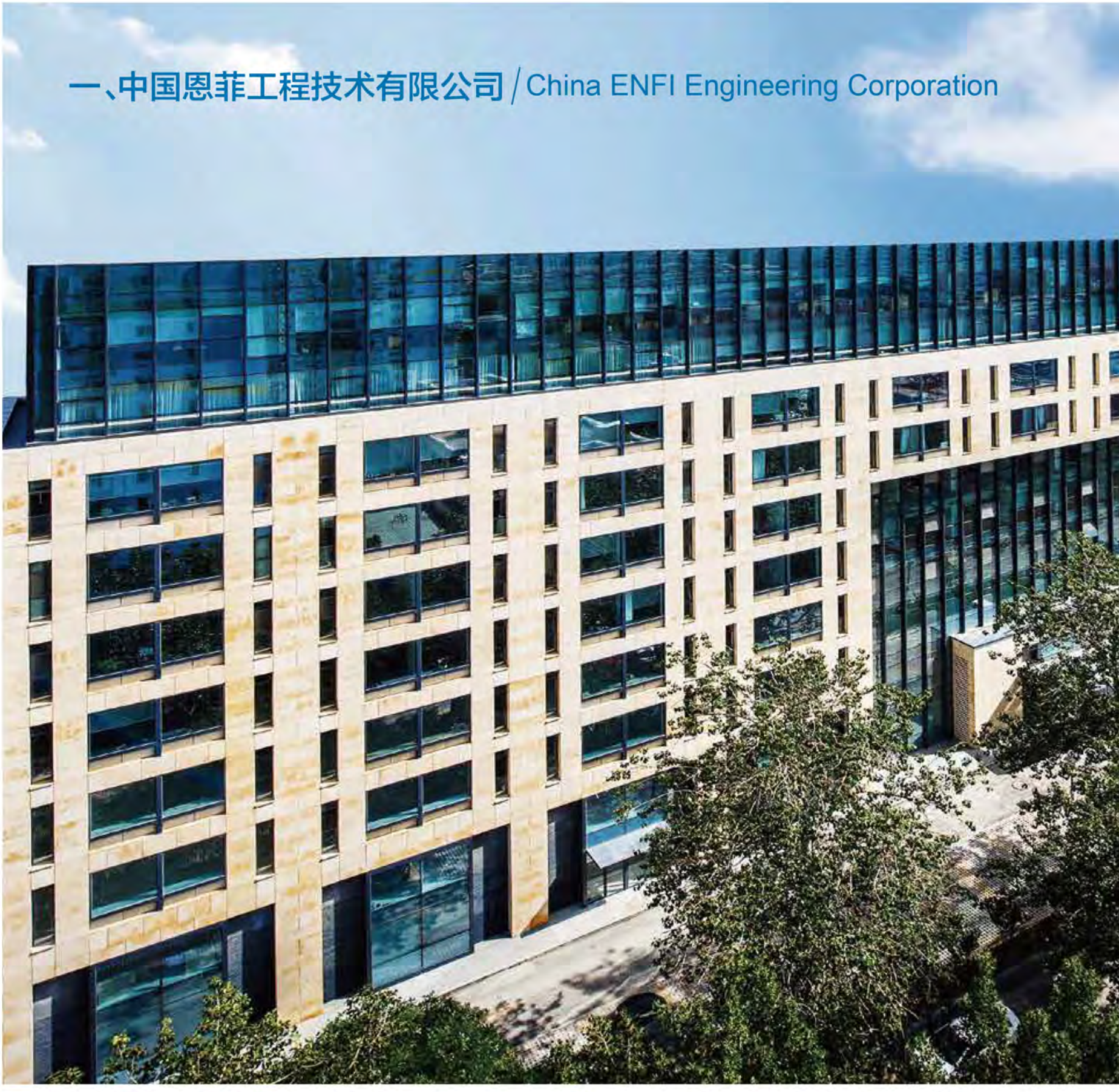
六、典型业绩 25
Typical Performance

1. 冶金自动化工程
The Metallurgical Automation Project
2. 矿山自动化工程
The Mine Automation Project
3. 电力及能源工程
The Power and Energy Project
4. 信息及软件集成
The Information and Software Integration
5. 智能装备集成制造
The Intelligent Equipment Integration Manufacturing

七、业务优势和战略伙伴 31
Business Advantages and Strategic Partners

1. 业务优势
The Business Advantages
2. 业务分布
The Business Distribution
3. 恩菲电气智能技术公司战略合作伙伴
The Strategic Partners of ENFI Electrical Intelligent Technology Company

一、中国恩菲工程技术有限公司 / China ENFI Engineering Corporation



简介
The Brief Introduction

中国有色工程有限公司暨中国恩菲工程技术有限公司（简称“中国恩菲”），前身是中国有色工程设计研究总院（即原北京有色冶金设计研究总院），成立于1953年，是中华人民共和国成立后，为恢复和发展我国有色金属工业而设立的第一家专业设计机构，现为世界五百强企业中国五矿、中冶集团骨干子企业。

中国恩菲拥有采选冶等40多个专业的设计力量，形成了包括工程院院士在内的高素质人才团队，搭建了全专业技术研发平台。截至目前，共获得国家级、省部级奖项900余项，拥有授权专利千余件。

中国恩菲拥有科学研究、工程服务与产业投资三大业务领域，深耕非煤矿山、有色冶金、水务资源、能源环境、新高材料、市政文旅、城市矿产、智能装备、房产经营九个业务单元，致力于成为最值得信赖的国际化工程综合服务商及能源环境发展商。

ENFI, formerly known as China Nonferrous Engineering and Research Institute, established in 1953,is the first engineering institute since the founding of the People's Republic of China dedicated to the recovery and development of China’s non-ferrous metals industry. ENFI is now a backbone subsidiary of MINMETALS and MCC, both in the Fortune 500 companies list.

ENFI has developed engineering design capabilities in over 40 disciplines, established a high quality talent team comprising academicians of Chinese Academy of Engineering and has built multi-disciplinary technological research and development platforms. So far, ENFI has won over 900 national-level and provincial-level awards, it has more than 1000 granted patents.

ENFI is dedicated to development of three business fields including scientific research, engineering service and industrial investment, especially the nine business units covering non-coal mine, nonferrous metal, water resource, energy and environment, hi-tech material, municipal culture and tourism, urban mining, intelligent equipment and real estate, relying on scientific and technological innovation. ENFI is striving to be the most trust worthy international company committed to integrated service for international projects and energy & environmental development.

资质
Qualification

工程设计综合甲级资质、工程咨询综合甲级资质、施工总承包壹级资质、工程监理甲级资质、环境影响评价甲级资质；

有色行业唯一拥有工程设计界等级最高、涵盖领域最广、条件要求最严的资质的企业，可承接工程领域全部21个行业所有设计业务，可承揽施工总承包一级资质证书许可范围内的工程总承包、工程项目管理和相关技术、咨询与管理服务。

ENFI has the comprehensive Grade A qualification of engineering design, comprehensive Grade A qualification of engineering consultation, first-level qualification of construction general contracting, grade A qualification of engineering supervision, Grade A qualification of environmental impact assessment.

ENFI is the only entity in the non-ferrous industry that has the qualification of highest level in the engineering design community, which covers the widest range of fields and conforms to the most stringent requirements. The company is qualified to undertake the design tasks of all the 21 industries in the engineering field, and to accept the orders of EPC, project management and the related technological consultation and management services within the permitted scope of the first-level qualification certificate of construction general contracting.

二、恩菲电气智能技术公司 / ENFI Electrical Intelligent Technology Company

恩菲电气智能技术公司
ENFI Electrical Intelligent Technology Company

恩菲电气智能技术公司（简称“恩菲智能”）以自主研发、技术创新为核心，专注于自动化、智能化、新能源、微电网、电力系统、信息和软件等业务领域，拥有完整的组织机构、强大的技术储备，形成了一支由行业设计大师和国家电气委员会专家领衔、诸多行业领军人才、教授级高级工程师和国家注册工程师为核心团队的高端技术人才队伍。目前，围绕相关领域，恩菲智能已经形成 100 多项专利成果，能够为客户提供技术咨询、工程设计、工程承包、装备制造、系统集成和运行维护等全流程服务。依托自身装备制造基地——恩菲洛阳电气智能分公司，公司实现年产达 2000 面电控柜。

恩菲智能致力于成为有色行业自动化、智能化、绿色化工厂解决方案的引领者。

With the independent R&D and technological innovation as its core strength, ENFI Electrical Intelligent Technology Company (ENFI Intelligence) focuses on such business area as automation, intelligence, new energy, micro grid, power system, information, software, etc. With its complete organization and strong technical reserve, ENFI Intelligence has forged a high-end technical talent team led by industry-level design masters and experts of the national electrical commission, and with many industry leaders, professor-level senior engineers and national-level registered engineers as its core members. Until now, the company has harvested more than 100 patent achievements in the relevant fields. The company can provide the customers with the whole-process services such as technical consultation, engineering design, engineering contracting, equipment manufacturing, system integration, operation, maintenance and so on. Relying on its own equipment manufacturing base – ENFI Luoyang Electrical Intelligent Technology Company, the company has achieved the annual output of 2,000 electronic control cabinets.

ENFI intelligence strives to become the leader in the area of automation, intelligence and green plant solutions in the non-ferrous industry.

恩菲洛阳电气智能分公司
China ENFI Luoyang Electric Intelligent Branch

洛阳电气智能分公司成立于 2018 年，位于河南省偃师市高龙镇石牛村（中硅高科院内），经营范围包括设备研制、设备采购及设备成套、系统集成等，具备年产 2000 面电气盘柜的能力。

China ENFI Luoyang Electric Intelligent Branch, established in 2018, is located in Shiniu Village, Gaolong Town, Yanshi City, Henan Province (inside the compound of SINOSICO Institute), and its business scope covers equipment development, equipment procurement and equipment integration, system integration, etc. It is capable of producing 2000 electric panel cabinets annually.

三、人才优势 / Talent Advantages

中国恩菲现有中国工程院院士 1 名，全国劳动模范 2 名，国家百千万人才 3 名，中央直接联系专家 2 名，澳大拉西亚矿业及冶金学会(AusIMM)院士 7 名(其中 Fellows 4 人)，全国工程勘察设计大师 3 名，全国有色金属行业设计大师 15 名，享受政府津贴专家 90 名，各类国家注册执业人员 525 名，高级职称以上人员近 700 人，注册电气工程师 44 人，一级建造师 70 人。

China ENFI now has 1 academician of Chinese academy of engineering, 3 national candidates of New CenturyTalents Engineering,2 Central Directly Contact Experts,3 academicians of the Australasian institute of mining and metallurgy (AusIMM)(Including 4 Fellows), 2 national model workers, 3 national engineering survey and design masters, 15 design masters of the national non-ferrous metal industry, 90 experts enjoying government subsidies, 525 national registered practitioners of various specialties, near 700 senior engineers, 44 registered electrical engineers and 70 first-level architects.

邵晓钢
应急管理部非煤矿山安全生产专家组成员、全国建筑物电气装置标准化技术委员会专家组成员、教授级高级工程师

Shao Xiaogang
A member of the expert group of the ministry of emergency management non-coal mine safety production, a member of the expert group of the national technical committee on standardized buildings electrical equipment of China, and a professorate senior engineer

蔡幼忠
有色金属行业设计大师
教授级高级工程师

Cai Youzhong
Non-ferrous metal industry design master
Professorate senior engineer

史更生
教授级高级工程师
注册电气工程师

Shi Gengsheng
Professorate senior engineer
Registered electrical engineer

王文辉
教授级高级工程师

Wang Wenhui
Professorate senior engineer

朱光辉
高级工程师
注册电气工程师

Zhu Guanghui
Senior engineer
Registered electrical engineer

李超林
教授级高级工程师
注册电气工程师

Li Chaolin
Professorate senior engineer
Registered electrical engineer

许海
教授级高级工程师
注册电气工程师

Xu Hai
Professorate senior engineer
Registered electrical engineer

熊志化（博士）
教授级高级工程师、一级建造师、注册咨询（投资）工程师、注册监理工程师

Xiong Zhihua (Doctor)
Professorate senior engineer, first-level construction engineer, registered consultation (investment) engineer, registered supervision engineer

陈贶
高级工程师、注册电气工程师、一级建造师、注册咨询(投资）工程师、注册一级消防工程师、软件设计师

Chen Kuang
Senior engineer, registered electrical engineer, first-level construction engineer, registered consultation (investment) engineer, registered first-level fire engineer software engineer

四、专长技术/Expertise Technology

1. 专长技术 Specialty Technical

基于大数据的智慧工厂整体解决方案 The total smart factory solutions based on big data

深度融合“云、移、物、大、智”，通过自主研发的生产管理系统、能源管控信息系统、企业信息化系统等实现产品与生产设备之间，数字世界与物理世界之间的互联互通，提供智慧工厂整体解决方案。

ENFI strives to deeply integrate the "cloud, mobility, object, large-scale, intelligence", to achieve the interconnectivity between the products and production equipment, the digital world and physical world by means of the self-developed production management system, energy control information system and enterprise information system, etc., and to provide the total smart factory solutions.

复杂冶炼过程控制技术 The control technology for complex smelting process

利用控制算法和先进装置，对底吹炉、顶吹炉、合成炉、闪速炉、回转炉、电炉、大型焙烧炉和高压浸出装置等多种复杂冶炼过程进行精准化控制，具有能耗低、效率高、成本低和智能化等特点。

The control algorithm and advanced equipment are used to realize the precise control of various types of complex smelting process, such as bottom blowing furnace, top blowing furnace, composite furnace, flash furnace, rotary furnace, electric furnace, large roaster and high-pressure leaching device, etc., which has the characteristics of low energy consumption, high efficiency, low cost and intelligence.

绿色智慧矿山技术 The green and intelligent mine technology

依托已有的矿井提升、无人采矿、充填系统、尾矿库在线监测和生态修复、磨选优化控制等专长技术，利用信息化、智能化融合互联网技术，坚持绿色发展、生态环保理念，实现了采选工艺数字化管控，形成立体化办公、信息共享、市场分析、成本管控的深度融合，提供绿色智慧矿山整体方案。

Based on the existing specialty technologies such as mine hoisting, unmanned mining, filling system, online monitoring and ecological restoration of tailings pond as well as optimization and control of grinding and separation etc., by incorporating the information and intelligence with the internet technology, ENFI adheres to the concept of green development and ecological and environmental protection, and has realized the digital control of mining and beneficiation process, achieved a deep integration of three-dimensional office, information sharing, market analysis and cost control, as well as provided the total solutions of green and intelligent mine.

多能互补型智能微电网技术 The smart multi-energy supplementary micro-grid technology

集“光伏、风电、储能、柴发”多种能源于一体，利用自主研发能源管控系统，并离网无缝切换，为无电、少电地区提供安全可靠、绿色环保、低价高质的满足工矿企业要求的智能电网综合解决方案。

By integrating various energy such as “photovoltaic, wind power, energy storage and diesel generation”, using the self-developed energy control system to fulfil the seamless on-and-off grid switching, ENFI provides the integrated intelligent power grid solutions for the no power or less power area, which are safe, reliable, eco-friendly, low-cost and of high-quality to meet the needs of the industrial and mining enterprises.

尾矿库光伏闭库生态修复技术 The photovoltaic and ecological restoration technologies for tailings pond closure

融合新能源、废石利用、尾矿闭库、土壤修复、生态恢复和旅游观光等一体，为尾矿库综合治理和利用提供全生命周期服务，具有良好的社会效应、生态效应和经济效应。

By integrating the new energy, waste rock utilization, tailings pond closure, soil restoration, ecological rehabilitation and tourism sightseeing, ENFI provides the one package services of comprehensive treatment and utilization of the tailings pond to achieve sound social, ecological and economic results.

智能装备集成制造专长 The specialty in the integrated manufacturing of intelligent equipment

集成和融合先进制造技术、信息技术和智能技术，制造具有感知、决策、执行功能的各类电气装备，实现智能工厂工程理念。

By integrating and incorporating the advanced manufacturing technology, information and intelligent technologies, ENFI makes various kinds of electrical equipment with the function of perception, decision-making and execution to implement the idea of intelligent engineering.

2. 专利技术
Patent Technology

电力、能源及自动化领域授权专利 100 多件，其中发明专利超 40 件。
Over 100 pieces of patents in the fields of electrical power, energy and automation have been granted to ENFI, among which there are over 40 pieces of invention patents.

申请号 Application Number	专利名称 Patent Name
CN201810779969.1	电动机控制系统及电动机驱动设备运行状态的判断方法 Judgement method for motor control system and operating state of motor driven equipment
CN201820027355.3	智能余热锅炉信息集成控制系统 Intelligent information Integration control system for waste heat boiler
CN201711318694.3	光储柴微电网供电系统及其控制方法 PV-Diesel-BESS microgrid power supply system and control method
CN201810016451.2	智能余热锅炉优化控制方法 Intelligent optimized control method for waste heat boiler
CN201721748417.1	电动机智能控制和保护系统 Intelligent motor control and protection system
CN201721748506.6	基于 IEC61850 的用于低压配电系统的智能处理装置 Intelligent processing device for low-voltage power distribution system based on IEC61850
CN201120225939.X	用于矿山井下双电机车前后牵引矿车的通信系统 Communication system for underground mine car traction by dual electrical locomotives at front and rear ends
CN201721333055.X	用于地下矿中段内的环网系统 Loop network system used in the level of underground mine
CN201721389653.9	智能配电系统 Intelligent power distribution system
CN201520363880.9	一种集电弓降弓装置以及具有其的集电弓 Pantograph dropping device and the pantograph with XX
CN201120226245.8	矿山井下运输线路的智能识别系统 Intelligent recognition system for underground mine transportation routes
CN201020682912.9	转炉的倾炉控制系统 Tilting furnace control system of converter
CN201120063335.X	氧气顶吹熔炼炉的点火控制系统 Ignition control system of oxygen top-blowing smelting furnace
CN201010197770.1	一种提升机预防尾绳扭结的保护控制装置 Protective control device against kinking of tail rope of hoist
CN201110058149.1	控制氧气顶吹熔炼炉喷枪提升的方法 Method of hoist control of oxygen top-blowing lance of smelting furnace
CN201110058613.7	氧气顶吹熔炼炉烧嘴的控制方法 Method of controlling oxygen top-blowing burner of smelting furnace
CN201310381663.8	无人驾驶电机车 Unmanned electric vehicle
CN201310167389.4	矿井提升机及其控制方法 Mine hoist and control method
CN201110058599.0	控制氧气顶吹熔炼炉喷枪冷却的系统 Control system for cooling oxygen top blowing lance of smelting furnace
CN201310671572.8	基于轨道称计量的自动加料控制方法、装置和系统 Automatic feeding control method, device and system based on track weighing measurement

3. 自动化和新能源奖项概览

Overview of Prizes Awarded for Achievements in Automation and New Energy

项目名称 Project Name	级别 Level	奖项名称 Award Name	级次 Grade	获奖时间 Award Time
生产多晶硅的方法 Method for polysilicon production	国家级 National level	中国专利奖 China patent award	金奖 Gold prize	2017 年
多晶硅生产用高效节能大型还原炉装备技术 High-efficiency and energy-saving large reduction furnace equipment technology for polysilicon production	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	一等奖 First prize	2018 年
垃圾熟化脱水与建筑光伏一体化综合利用技术 Integrated utilization technologies for waste slaking, dewatering and building photovoltaic	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	一等奖 First prize	2014 年
扬州市生活垃圾焚烧发电厂 Domestic waste incineration power plant in Yangzhang city	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	一等奖 First prize	2013 年
谦比希铜冶炼厂综合自动化控制系统 Computer online control for nickel flash furnace of Jinchuan Nickel Group	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	一等奖 First prize	2010 年
金川镍闪速炉计算机在线控制 Computer online control for nickel flash furnace in Jinchuan	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	一等奖 First prize	1998 年
多晶硅高效节能环保生产新技术、装备与产业化 New technology, equipment and industrialization for high-efficiency, energy-saving and environment-friendly production of polysilicon	国家级 National level	科技进步奖 Scientific and technological progress award	二等奖 Second prize	2012 年
有色金属矿山节能设计规范 Energy-saving design code for non-ferrous metal mine	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	二等奖 Second prize	2011 年
基于 ArchestrA 和业务架构平台的生产管控信息系统 Information system for production management based on ArchestrA and business framework platform	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	二等奖 Second prize	2010 年
矿山提升机后备保护设备 – 电子监控器 Mine hoist backup protection equipment-electronic monitor	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	二等奖 Second prize	2007 年
新型矿井提升机安全控制技术的创新与开发应用 Innovation, development and application of new safety control technology for mine hoist	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	二等奖 Second prize	2003 年
大冶有色铜精炼系统集成化创新与应用 Innovation and application of Integrated copper refining system of Daye Nonferrous Metals Group Holdings Co., Ltd	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	三等奖 Third prize	2016 年
提高竖井提升机能力的综合研究与应用 Comprehensive research and application of shaft hoist capability improvement	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	三等奖 Third prize	2008 年
电炉节能模糊控制系统的开发与应用 Development and application of fuzzy control system for electric furnace energy-saving	省部级 Provincial and ministerial level	科技进步奖 Scientific and technological progress award	三等奖 Third prize	1998 年

4. 课题及实验室
Project and laboratory

国家级工程实验室—多晶硅材料制备技术
The national-level engineering laboratory—polysilicon material manufacturing technology

科技创新平台—中冶太阳能光伏光热工程技术中心
The scientific innovation platform—MCC solar power photovoltaic and photo-thermal engineering technology center

承担多个国家“863 计划”课题“垃圾焚烧废物(气)处置与稳定化控制技术”、“多晶硅副产物利用关键技术研究”和“还原炉控制系统”课题研究
The center undertakes quite a few research projects in the High-tech R&D Program of China (863 Program) such as “Solid waste (waste gas) disposal from waste incineration and stability control technology”, “Key technology research of polysilicon byproduct utilization” and “Reduction furnace control system”

实验室—智能微电网实验室、尾矿库光伏闭库生态修复实验室
The laboratory—intelligent micro-grid laboratory, photovoltaic and ecological restoration laboratory for tailings pond closure

国家有色冶金机电产品质量监督检验中心
National quality supervision and inspection center of nonferrous metallurgical mechanical and electrical products

工业节能与绿色发展评价中心
The Industrial energy-saving and green development evaluation center

五、业务概览 / Main Business

●智能化、自动化系统 The Intelligent and Automatic System

依托 66 年的有色工艺优势，利用先进的控制理念和装置，提供冶金、矿山、环保、索道等领域智能化、自动化工程的整套解决方案，是有色行业少数几家能提供智能制造系统解决方案的服务商之一。

Relying on the 66 years' advantages of the non-ferrous technology, and using the advanced control concept and devices, ENFI provides the package of solutions of intelligent and automation engineering in metallurgy, mining, environmental protection, ropeway and the like. It is one of the few service providers in the non-ferrous industry that can provide system solutions for intelligent manufacturing.

●电力及能源工程 The Power and Energy Project

最早进入新能源和节能领域，并成功开发出应用于海外、海岛等偏远无电（少电）地区的多能互补型智能微电网系统，是集光伏、风电、储能、火电、微电网、节能、环保等于一体的综合能源服务商。

ENFI was the first to enter the field of new energy and energy conservation, and has successfully developed the smart multi-energy complementary micro-grid system which can be used in the remote area with no power (or less power) such as offshore islands. ENFI has become the integrated energy service provider that integrates photovoltaic power, wind power, energy storage, thermal power, micro grid, energy saving and environmental protection.

●信息及软件集成 The Information and Software Integration

凭借在有色行业的领先地位和多年项目经验，自主研发了具有完全自主产权的生产管理信息化系统，广泛应用于有色行业。

With its leading position in the non-ferrous industry and years of project experience, ENFI has independently developed a production management information system with completely independent property rights, which is widely used in the non-ferrous industry.

●智能装备集成制造 The Integrated Manufacturing of Intelligent Equipment

成立专门的洛阳电气智能分公司，专业集成自动化控制系统设备、智能低压配电设备、智能非标电控设备，是公司核心技术、特色技术、智能技术的载体装备。

ENFI has set up a special branch company, the Luoyang Electrical Intelligent Technology Company to perform the specialized integration of automation control system equipment, intelligent low-voltage distribution equipment and intelligent non-standard electronic control equipment, which are the carrier equipment for the core technology, special technology and intelligent technology of ENFI.

●检测与评估 The Testing and Evaluation

引进多套国际领先水平的检测仪器和设备，并设立有机电产品电气检测、工业节能与绿色发展评估中心和尾矿库技术安全评价中心等多个机构，检测范围系统全面。

ENFI has introduced a number of internationally advanced testing instruments and equipment, and has set up several specialized units, such as the electrical testing center for mechanical and electrical products, the evaluation center for industrial energy conservation and green development, and the technical safety evaluation center for tailings ponds. The testing scope is systematic and comprehensive.

1. 智能化、自动化工程
Intelligence and Automation Engineering Project

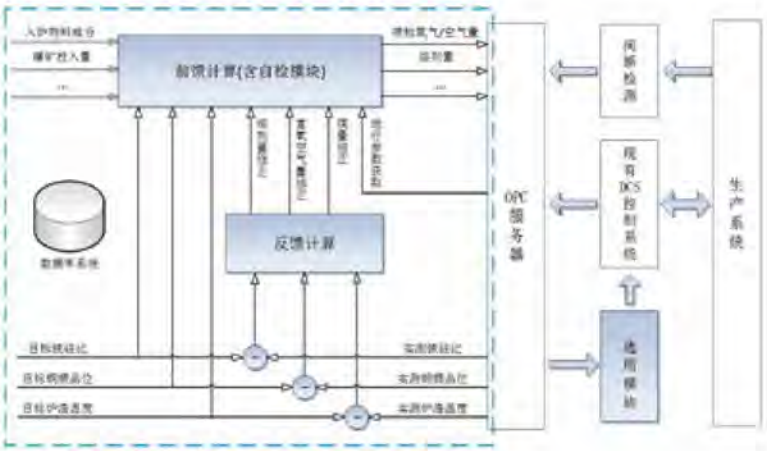
1.1 冶金自动化系统 The metallurgical automation system

1.1.1 ENFI先进过程控制系统(EAPC)

The ENFI advanced process control system (EAPC)

采用先进控制理论和方法，以工艺过程分析和数学模型计算为核心，以工厂控制和管理网络为信息载体，实现多变量模型预测控制，确保平稳运行和效益最优。

By using advanced control theory and method, with the process analysis and mathematical model calculation as the core, with the plant control and management network as the information carrier, the multi-variable model predictive control is achieved to ensure the stable operation and optimal benefit.

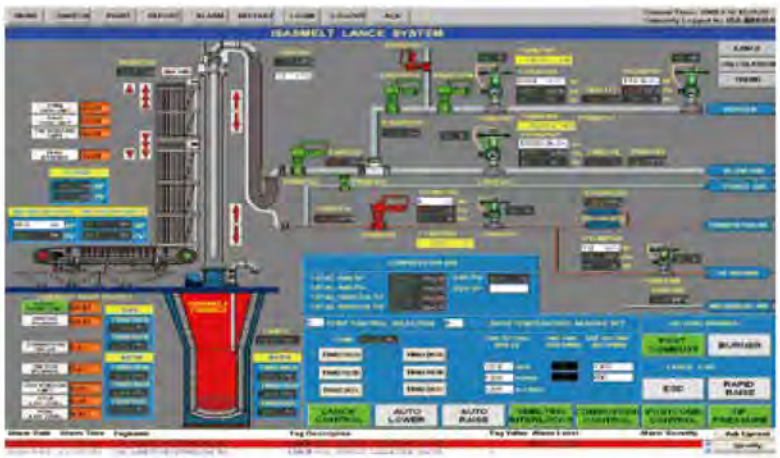


1.1.2 氧气底吹（顶吹）熔炼自动化系统

The oxygen bottom blowing (top blowing) smelting automation system

氧气底吹熔炼自动化控制系统以氧气底吹熔炼工艺为依托，采用先进的检测装置和控制技术，对底吹炉、还原炉、烟化炉等主工艺核心设备及余热锅炉、振打系统等设备进行优化控制。该系统对还原炉建立配料计算数学模型，编制智能算法工艺控制软件包，形成了标准化控制系统。

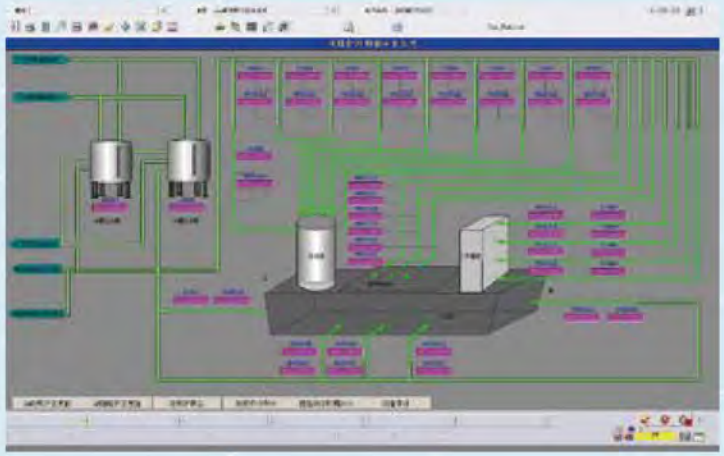
Based on the oxygen bottom-blowing smelting process, by using the advanced detection device and control technology, the oxygen bottom blowing smelting automatic control system realizes the optimized control of the core equipment in the main process such as bottom blowing furnace, reduction furnace and fuming furnace, etc. and the control of the waste heat boiler and the rapping system. The blending calculation model is set up in the system for the reduction furnace and the software package of intelligent algorithm for process control is compiled, which forms the standardized control system.



1.1.3 闪速炉熔炼自动化系统
The flash furnace smelting automation system

对闪速炉熔炼、PS 转炉吹炼、配加料系统、余热锅炉等工艺流程进行参数检测和优化控制，保证了系统平稳、安全，稳定金属品位，低能耗运行。

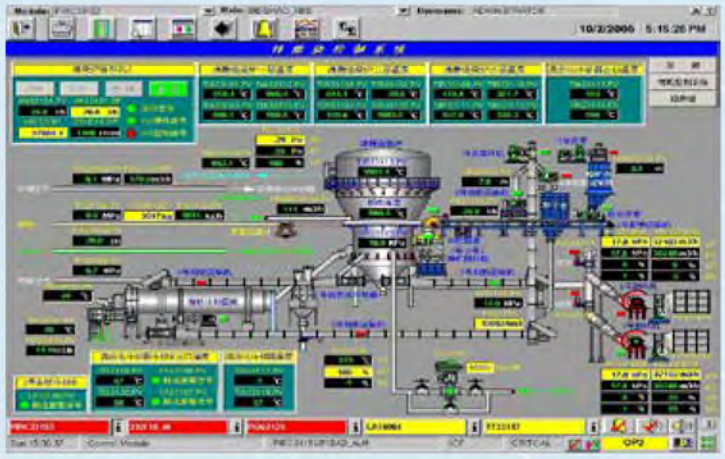
The parameter detection and optimized control are carried out on the process such as flash furnace smelting, PS converter blowing, charging and blending system and waste heat boiler, etc. to ensure that the system is stable and safe, and operates with stable metal grade and low energy-consumption .



1.1.4 大型焙烧炉自动化系统
The automation system of large roaster

自主开发了给料及焙砂冷却装置，实现焙烧系统全流程自动化控制，达到世界领先水平利于焙烧炉提高热稳定性和炉寿。

The feeding and calcine cooling devices are self-developed to execute the automatic control of the whole process of roasting system, which is of the leading level of the world and is conducive to improving the thermal stability and the campaign life of the roaster.

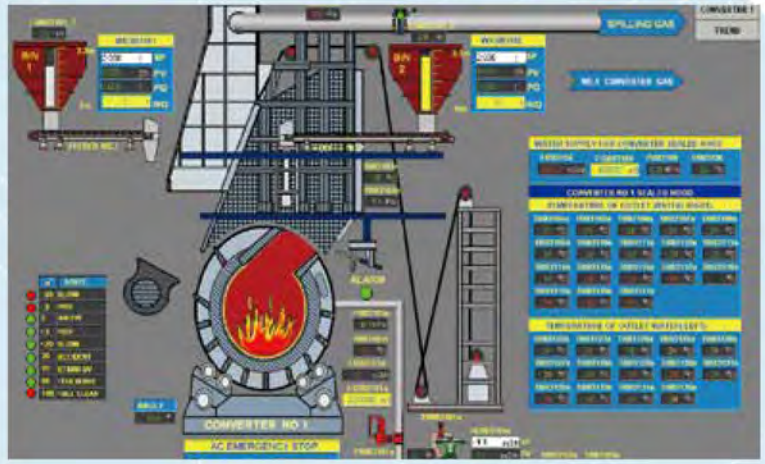


1.1 冶金自动化系统 The metallurgical automation system

1.1.5 回转炉自动化系统
The automation system of rotary furnace

回转炉传动电控系统为转炉、阳极炉、底吹炉等传动与电控一体化装置，由配电、传动、检测与控制部分组成。

The transmission and electrical control system of rotary furnace integrates the transmission and electric control of the converter, anode furnace and bottom blowing furnace, etc., which is composed of such parts as power distribution, transmission, detection and control .



1.1.6 电炉电力及自动化系统
The electric power and automation system of the electric furnace

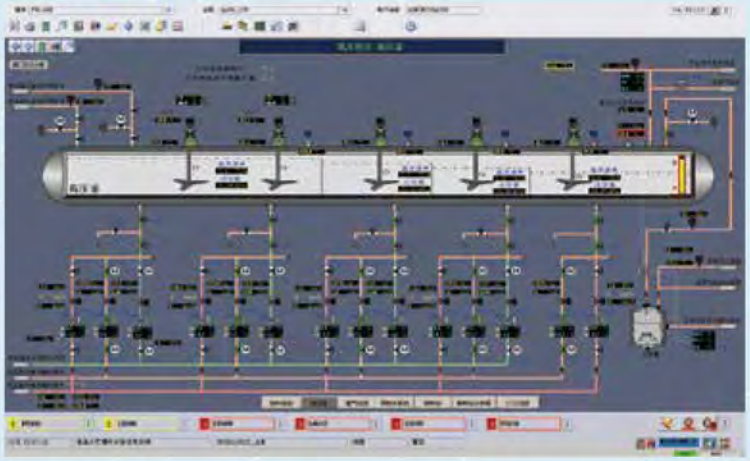
以专家系统为核心的电炉优化控制系统EF-APC，用于各式埋弧电炉和电弧炉的控制，提高功率平稳性和炉寿，降低能耗指标，更适用于弱电网系统。

The EF-APC, Electric Furnace-Advanced Process Control system with the expert system as its core, is used to control all sorts of submerged arc furnace and electric arc furnace, improve the stability of power and the campaign life and lower the energy consumption index. The system is more suitable for the weak current network system.

1.1.7 氧压浸出自动化系统
The automation system for oxygen pressure leaching

采用专家系统和神经网络相结合的算法，适用于加压硫酸浸出、氧压浸出、红土矿高压酸浸等工艺流程。

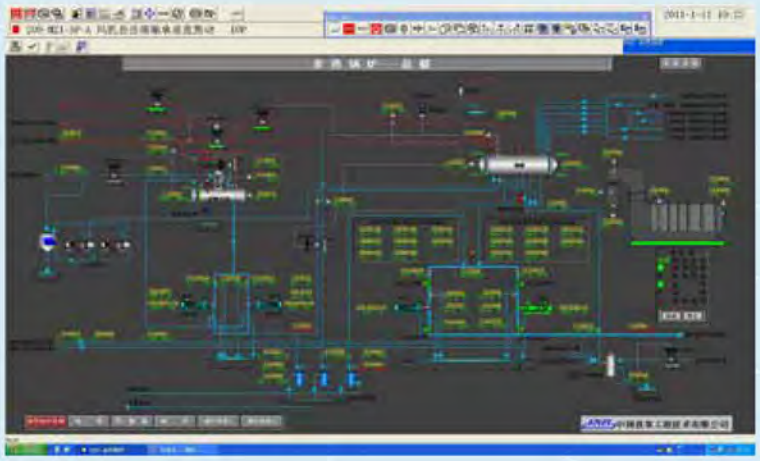
The algorithm combining the expert system and the neural network applies to the process such as pressure sulfuric acid leaching and oxygen pressure leaching and HPAL of laterite ore, etc.



1.1.8 智能余热锅炉自动化系统
The automation system for intelligent waste heat boiler

采用专家系统对单套余热锅炉控制系统采用模块化设计方案，分烟气、汽水、加药排污、安全联锁四套子系统，自成一体，内部测控设施齐全，与前后工段智能联锁，具备一键启停功能，适用于各类余热锅炉。

By using the expert system, the modular design is adopted in the control system for single unit of waste heat boiler. The system consists four sub-systems including off-gas, steam & water, dosing & waste discharge and safety interlocking, which are integrated as a whole. The system has complete internal monitoring and control devices, it is intelligently interlocked with the upper and lower processes and has the one button start-stop function, therefore, is suitable for all types of waste heat boiler.

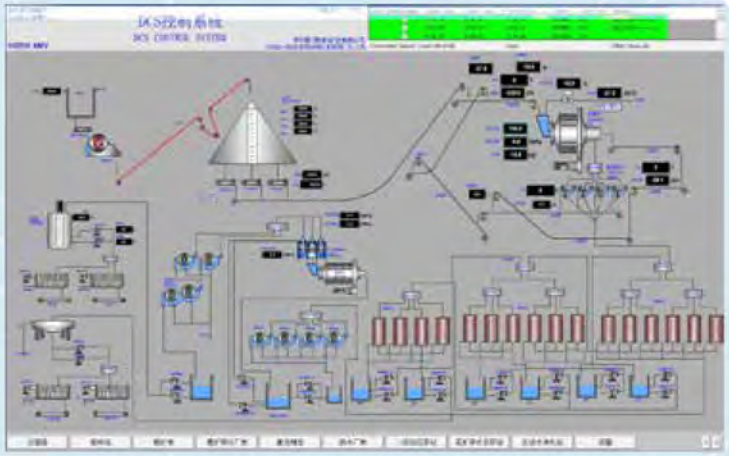


1.2 矿山自动化系统 The mines automation system

1.2.1 采矿自动化系统
The mining automation system

融合提升机、通风、运输、充填、排水、供配电、信息及安全系统等技术的采矿自动化系统。以光缆骨干网辅以铜缆总线的综合管控网络为基础，融合高低压供配电系统与各固定设备控制系统，实现了地下矿生产过程全面信息化、数字化、自动化、智能化，是国内领先、国际先进的综合解决方案。

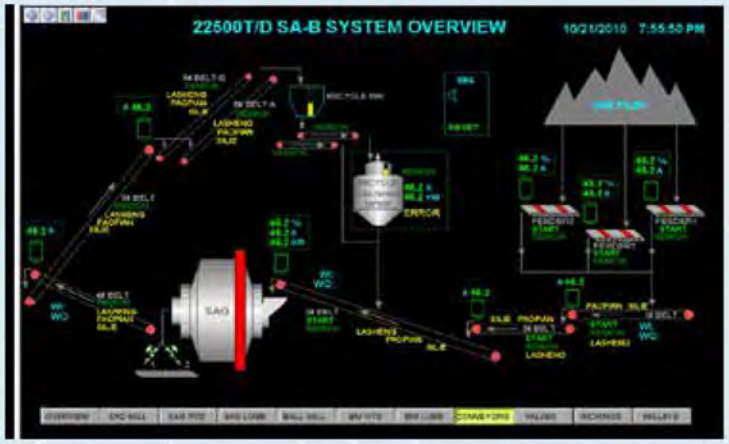
The mining automation system integrates the technologies such as hoist, ventilation, haulage, filling, drainage, power supply and distribution, information and safety system, etc. Based on the integrated control network with the optical cable network as its backbone network supplemented by the copper bus line, by incorporating the high and low voltage power supply and distribution system with all the fixed equipment control system, the complete informatization, digitalization, automation and intelligentization of the underground mine production process is achieved, which is the domestic leading and international advanced integrated solution.



1.2.2 选矿自动化系统
The beneficiation automation system

主要包括磨矿和选矿自动化系统，对生产过程中的一般工艺参数进行监测，对重要工艺参数设置必要的自动调节回路，对可能引起设备故障或人身事故的工况设置参数报警或联锁控制。设计完善的工艺参数指示和控制回路保证磨浮生产过程稳定和高效地运行。

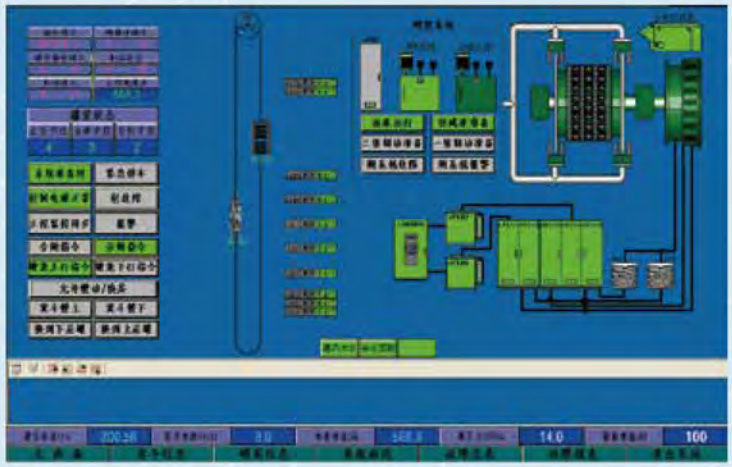
The system mainly includes the automation system for grinding and separation, which monitors the general process parameters during the production. Some necessary automatic regulation circuits are set for the important process parameters, and the parameter alarming or interlocked control is set for the working conditions that may cause equipment failure or personal injury. The perfectly designed process parameter indication and control circuits ensure the stable and highly efficient operation of the grinding and flotation processes.



1.2.3 矿井提升自动化系统
The mine hoist automation system

采用免维护、操作界面友好、安全性强的软甲系统，实现了多台提升设备的集中监控，适用于摩擦式、缠绕式、箕斗式、罐笼式、箕斗－罐笼混合式等各类矿井提升机。

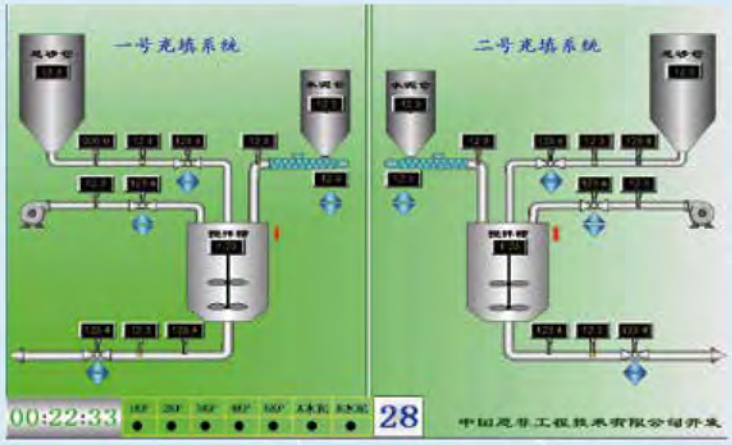
The soft armor system which is of maintenance free, with friendly operation interface and strong security is used to realize the centralized monitoring of multiple hoist equipment, which applies to all types of mine hoists, including friction, winding, skip and cage types as well as the mixed type pf skip-cage.



1.2.4 充填自动化系统
The filling automation system

采用先进的分散型控制系统，选用实用型仪表，开发出独具特色的膏体充填自动化控制系统。系统有效控制填充项目中物料配比、膏体料浆浓度等重要参数指标，保证了膏体充填生产过程的高效、稳定运行，效益显著。荣获国家科技进步二等奖、中国有色金属工业总公司科技进步一等奖。

The unique paste filling automatic control system is developed by using the advanced distribution-type control system and the utility-type instruments. The system effectively controls the significant parameters and indexes such as the material blending ratio and paste slurry concentration, etc. to ensure the efficient and stable operation of the paste filling production, which is of remarkable benefits. The system has been awarded the second prize of the National Scientific and Technological Progress Award and the first prize of the Scientific and Technological Progress of China Non-ferrous Metals Industry Corporation.



1.2.5 无人驾驶电机车运输系统
The unmanned electric locomotive haulage system

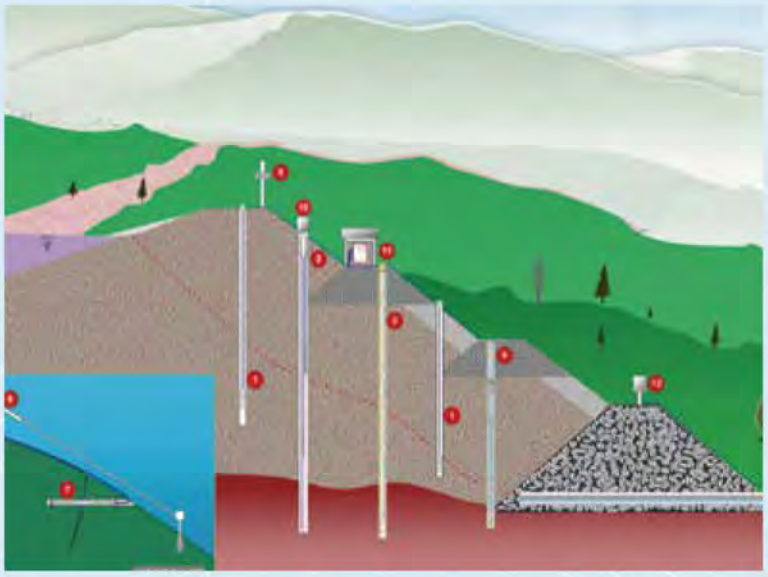
由电机车自动运行控制系统(ATO)、电机车运行保护系统(ATP)、运输系统、电机车编组调度指挥系统(ATS)、巷道无线通讯系统及辅助系统等构成，适用于多列编组、多机传动、多弯道岔道等复杂工况条件。

The system consists of automatic train operation system (ATO), automatic train protection system (ATP), haulage system, automatic train supervision system (ATS), laneway wireless communication system and auxiliary system, which applies to the complex working conditions such as multi-train marshalling, multi-motor drive, multi-bend, multi-crossing, etc.

1.2.6 尾矿库在线监测系统
The online monitoring system for tailings pond

主要由监测仪器、数据采集装置、通信装置、监测计算机、数据采集软件、安全电源、防雷系统和信号线路等构成，实现坝体位移、浸润线、渗流、库水位、干滩、降水量和库区视频监控等功能。

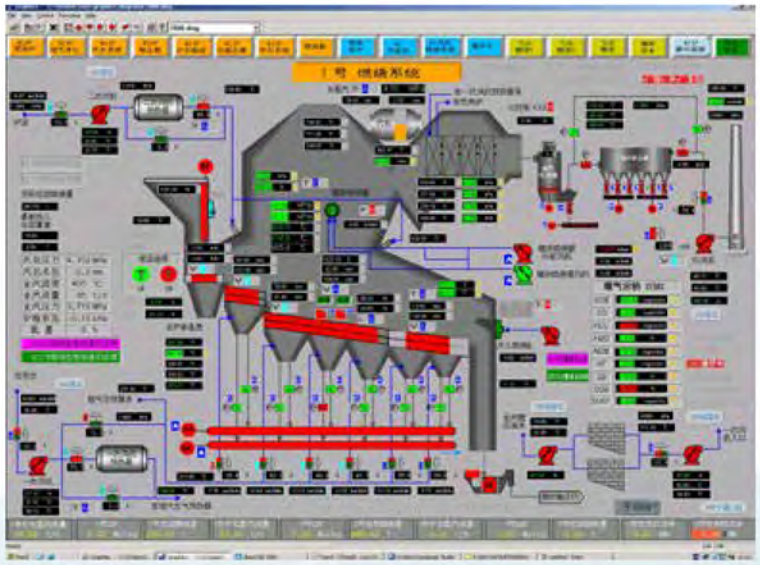
The system mainly consists of monitoring instrument, data acquisition unit, communication device, monitoring computer, data acquisition software, safety power supply, lightning protection system and signal circuit, etc., which is to achieve such functions as monitoring the dam displacement, the phreatic line, the seepage, the pond water level, the dry beach and the rainfall, and video monitoring of the tailings pond area.



1.3 垃圾焚烧自动化系统 The waste incineration automation system

垃圾焚烧工艺流程的核心，采用的先进控制算法，保证垃圾焚烧系统稳定经济运行，确保排放指标满足环保要求。

The system plays the core role in the waste incineration process, in which the advanced control algorithm is adopted to ensure the stable and economic operation of the waste incineration system and to ensure the emissions meet the environmental requirements.



1.4 索道安全智能监控系统 The cableway safety intelligent monitoring system

以索道运行数据及景区管理的相关数据的分析为基础，涵盖广播、监控、设备管理等各个方面，提高索道安全管理和运营水平。

Based on the analysis of the relevant data of cableway operation and scenic spot management, the system controls the broadcast, monitoring, equipment management and so on to improve the safety management and the operation performance of the cableway.

2. 电力及能源工程 Power and energy project

2.1 光伏发电系统 The photovoltaic power system

利用沙漠、荒地、沼泽、鱼塘、滩涂、屋顶、车棚等土地或资源，建设光伏电站。

The photovoltaic power station is built by utilizing such land or resources as desert, wasteland, swamp, fish pond, beach, roof, carport, etc.

2.2 储能系统 The energy storage system

主要由储能电池阵列、电池管理系统 (EMS)、能量控制系统 (PCS)、变压器、高低压配电装置、监控系统、消防和空调等组成，是多种电力能源与稳定的负荷需求之间的缓冲器。

The system mainly consists of energy storage battery array, energy management system (EMS), push to communication system (PCS), transformer, high and low voltage power distribution unit, monitoring system, firefighting system and air conditioning system, which is the buffer between the multiple power sources and the stable load demand.

2.3 多能互补型智能微电网系统 The smart multi-energy complementary micro-grid system

融合光伏、风电、燃气、柴发、储能等多种能源，配置能源管控系统，能满足工矿负荷需要，降低成本，提高电网稳定性，节能减排，保护环境，改善电能质量。

The system integrates photovoltaic power, wind power, gas power, diesel power, energy storage and other energy sources and is fitted with energy management system to meet the load needs of the industrial and mining enterprises. It contributes to the cost reduction, the improvement of the grid stability, the energy conservation and emission reduction, the environment protection, and the improvement of the power quality.

2.4 综合能源管理系统 The integrated energy management system

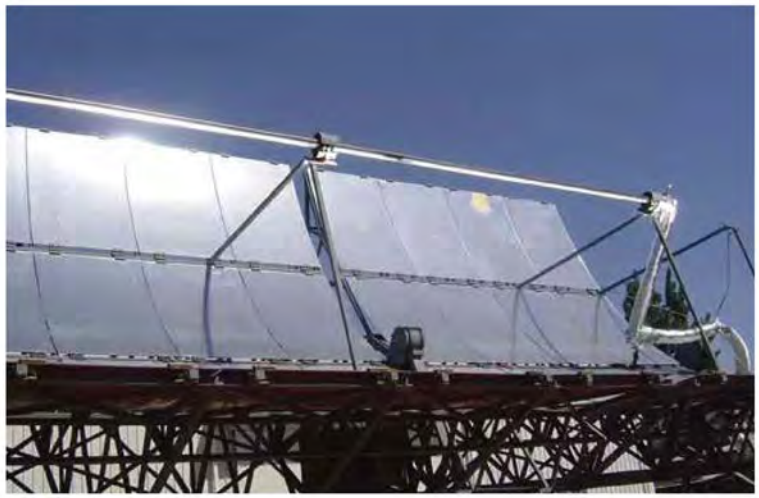
结合工厂用电、用冷、用热、用气（汽）、用水需求，设备和照明节能改造、燃气、光伏、风电、水蓄冷、蓄热、储能等多种能源方式，建设能源管控平台，优化调整能源结构，提升能源价值、降低能耗、增强供能灵活性和安全性，建立清洁高效稳定的能源体系。

Considering the needs for power, cold & heat utilities, air, steam and water, also considering the energy-saving renovation for equipment and lighting and the multiple energy sources such as gas power, photovoltaic power, wind power, chilled water thermal storage, heat storage and energy storage, etc., the energy management and control platform is built up to optimize and adjust the energy structure, increase energy value, reduce energy consumption, increase the flexibility and safety of energy supply, and to establish the clean, efficient and stable energy system.

2.5 光热及电蓄热系统 The photo-thermal and electric heat storage system

利用太阳能或夜间低成本谷电加热工质，产生过热蒸汽或高温流动工质，并将热能储存在蓄热体内，为后续工艺提供稳定、持续的蒸汽、热水、热能等，广泛用于发电、供热、供暖等领域。

The solar energy or the night low cost off-peak electricity is used to heat the working medium to produce superheated steam or high-temperature flowing medium, which enables the thermal energy be stored in the heat accumulator to provide stable and continuous steam, hot water and heat for the subsequent processes. It is widely used in power generation, heat supply, heating and so on.



2.6 风力发电系统 The wind power system

安装风力发电机组，将风能转换为机械能，机械能带动转子旋转输出交流电，经变压器和电力线路汇集输出电能。

The wind mill generator unit is installed to convert the wind energy into mechanical energy, which drives the rotor to generate AC which is converged and transmitted as electric power through transformers and power lines.

2.7 发输变电系统 The power generation, transmission and transformation system

包括发电、输电、变电系统，具体有重油发电站、柴油发电站、燃煤电站、余热电站、生活垃圾焚烧发电站、变配电站、整流站等。

The system includes power generation, transmission and transformation systems, to be more specific, it consists of heavy oil power station, diesel power station, coal-fired power station, waste heat power station, domestic waste incineration power station, transformer substation, rectifier station, etc.

2.8 智能化供配电系统 The intelligent power supply and distribution system

采用总线等通讯方式将供配电元器件连接起来，实现对现场设备、电网或其他控制器等监控的供配电系统，实现每条回路的远程控制，具备可靠的安全保护，完善的管理和统计功能。

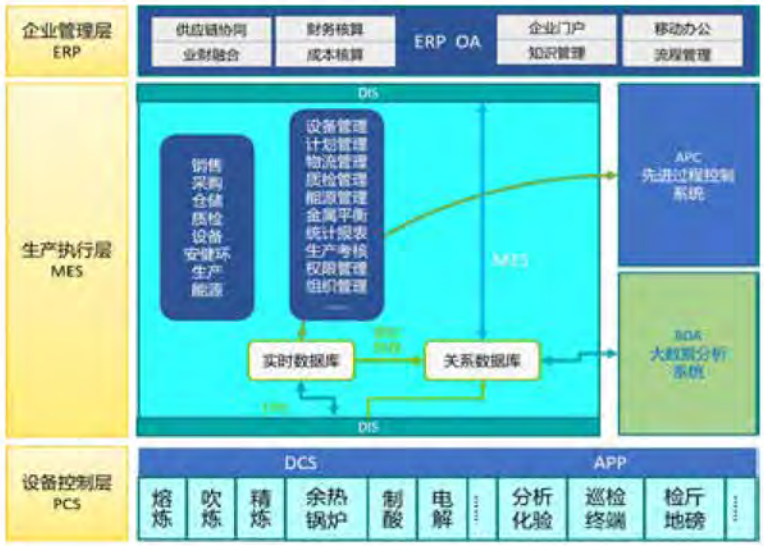
It is the power supply and distribution system, the components of which are connected by means of such communication method as bus and so on to realize the monitor and control of the site equipment, grid or other controller, and to achieve the remote control of each loop. The system has reliable security protection, perfect management and statistical functions.

3. 信息及软件集成 Information and Software Integration

3.1 智慧工厂整体解决服务 The total smart factory solutions service

采用先进的信息通信技术，对企业的经营管理、生产执行、过程控制等进行全面感知、分析和优化，包括无人化原料场、冶金炉专家系统到矿山、冶金控制模型，从全厂生产智能化调度、能源优化到大数据分析和智能算法等。

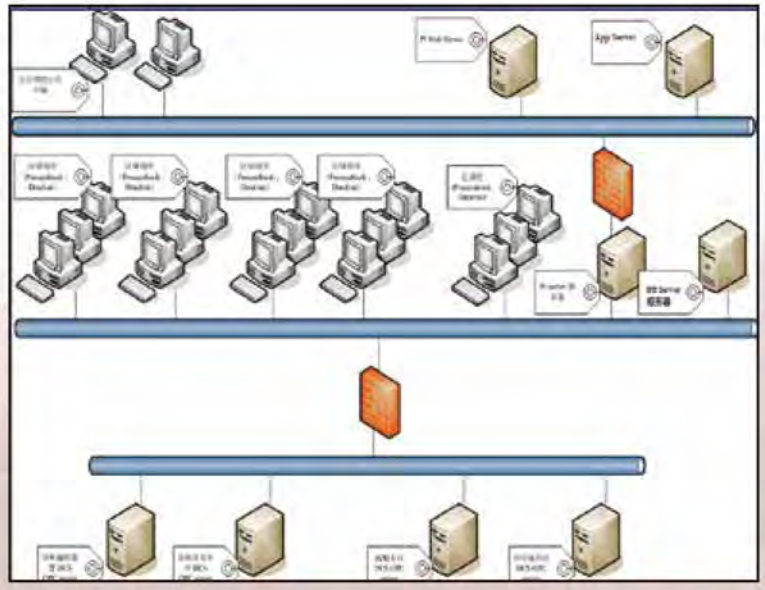
By using advanced information and communication technology, the management, production execution and process control of the enterprise are comprehensively sensed, analyzed and optimized, the instances of which include unmanned raw material yard, metallurgical furnace expert system, mining & metallurgical control model, intelligent plant production dispatching, energy optimization, big data analysis, intelligent algorithm, etc.



3.2 生产管理信息系统（MES）The manufacturing execution system (MES)

自主研发、完全具有自主知识产权，并已申报软件著作权和专利权，以生产计划为依据，通过采集生产过程中的实时工艺信息和设备运行状态信息，提供实时监控、生产计划与统计、生产调度、质量管理、设备管理、能源管理等功能的一体化企业生产管理解决方案，荣获 2010 年中国有色金属工业协会科学技术二等奖。

The system, with fully independent intellectual property rights, is independently developed by ENFI, and the application of software copyright and patent right have been delivered. On the basis of production plan and by collecting the real-time process information and equipment running status information in the production, the system gives out a total package of integrated enterprise production management solutions that provides real-time monitoring, production planning and statistics, production scheduling, quality management, equipment management and energy management, etc., it was awarded the second prize of Science and Technology of China Nonferrous Metals Industry Association in 2010.



3.3 能源管理系统（EMS） The energy management system (EMS)

采用分层分布式系统体系结构，对企业的电力、燃气、水、蒸汽等各分类能耗数据进行采集、处理，根据工艺生产情况，实现对能源的统一调度、优化煤气平衡、减少煤气放散、提高环保质量，并分析能耗状况，实现节能应用等。

By using the layered and distributed system structure, the classified data of energy consumption of electricity, gas, water, steam, etc. of the plant is collected and processed, so that the system, according to the production status, performs the unified energy dispatching to optimize the gas balance, reduce gas releasing, improve environment quality, and by analyzing the energy consumption to implement energy-saving measures.

3.4 视频及安防系统 The video and security system

利用数字网络监控、无线监控、耐高温监控、热红外成像监控等手段，通过高效的视频网络传输系统和优质的视频管理服务平台，为业主提供贴合采、选、冶生产工艺并满足其管理需求的视频和安防解决方案。

By using the measures such as digital network monitoring, wireless monitoring, high-temperature resistant monitoring, thermal infrared imaging monitoring, etc., with the assistance of the efficient video network transmission system and the high-quality video management service platform, the system provides the clients with a package of video and security solutions that fits the processes of mining, beneficiation and smelting and meets the management needs of the clients.

4. 核心装备 Core Equipment

4.1 控制系统柜 The control system cabinet

包括 PLC 机柜、DCS 机柜、网络系统柜等，适用于网络、通信和工业控制等各个领域。

The control system cabinet, including PLC cabinet, DCS cabinet and network cabinet, is suitable for networking, communications and industrial control.

4.2 控制柜（箱）The control cabinet (box)

控制柜是按电气接线要求将开关设备、测量仪表、保护电器和辅助设备组装在封闭或半封闭金属柜中或屏幅上，其布置应满足电力系统正常运行的要求，便于检修，安全性高。

In the control cabinet (box), the switching devices, measuring instruments, protective appliances and auxiliary equipment are assembled, according to the electrical wiring requirements, in the closed or semi-closed metal cabinet or on screen, the layout of which satisfies the normal operation of the power system and is easy to examine and repair, and is of high security.

4.3 配电柜（箱） The distribution cabinet (box)

配电柜（箱）分动力配电柜（箱）和照明配电柜（箱）、计量柜（箱），是配电系统的末级设备。配电柜是电动机控制中心的统称。

The distribution cabinet (box) can be divided into power distribution cabinet (box), lighting distribution cabinet (box) and metering cabinet (box), which are the end equipment of the power distribution system. Distribution cabinet is the collective name for motor control center.

4.4 软件开发及销售 The software development and sales

提供具有完全自主知识产权的生产管理系统 (MES)、能源管控系统 (EMS) 、先进控制系统 (APC)、监控系统等软件的开发、销售、调试等服务。

The services are provided of the development, sales, commissioning and so on of such software as manufacturing execution system (MES), energy management system (EMS), advanced process control system (APC), and monitoring system with completely independent intellectual property rights.

4.5 电气及自动化产品代理与集成供货
The electrical and automation products agency and integrated supply

与国内外众多知名品牌保持战略合作，代理销售和集成供货其电气及自动化产品，包括仪器仪表、检测装置、自动化产品、电气设备、机电产品、数字装备和软件等，提供全方位服务。

Through the strategic cooperation with many well-known brands at home and abroad, the Luoyang Electric Intelligent Branch acts as the agent and integrated supplier of such electrical and automation products as instrument, testing device, automation product, electrical equipment, mechanical and electrical product, digital equipment and software, etc. to provide the all-around services.

4.6 充电桩 The charging pile

充电桩能根据不同的电压等级为各种型号的电动汽车充电，其输入端与交流电网直接连接，输出端都装有充电插头，可提供常规充电和快速充电两种充电方式。

The charging pile can charge various types of electric vehicles according to different voltage levels, and its input end is directly connected to the AC power grid while the output end is equipped with a charging plug, which can provide two charging modes, normal charging mode and fast charging mode.

4.7 预装式变电站、储能站
The prefabricated substation and energy storage station

集成主变压器、高压柜、电池、母线、自动化系统、通讯、远动、暖通、消防等于一体的钢结构箱体内，具有系统性、安全性、可靠性、施工快、易维护、一体化的优点，满足各类应用领域。

By integrating such components as the main transformer, high-voltage board, battery, bus, automation system, communication, remote control, HVAC, fire protection, etc. into the steel structure box, the captioned stations have the advantages of being systematic, safe, reliable, quick to build, easy to maintain and being integrated, which suit for various application fields.

4.8 其他有色矿冶智能装备
Other intelligent equipment for non-ferrous metal mining and metallurgy

包括广泛应用于有色矿冶领域的多功能无人吊车、地下无人采矿车、智能提升机、智能冶金炉、智能余热锅炉、冶金专用机器人、电力负荷平衡装置等。

Including equipment that has been widely adopted in non-ferrous metallurgy, such as multifunctional unmanned crane, underground unmanned mining vehicle, intelligent hoist, intelligent metallurgical furnace, intelligent waste heat boiler, metallurgy-used robot, and complete sets of device for microgrid and power load balancing device.

六、典型业绩 / Typical Performance

1. 冶金自动化工程 The Metallurgical Automation Project

1.1 冶炼全厂自动化 The refinery automation

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	驰宏会泽锌浸出渣处理环保节能技改工程熔化炉项目自动化系统项目 Technological upgrading of environmental protection and energy saving and melting furnace automation system for Zn leaching residue treatment of Chihong company in Huize county	云南驰宏锌锗股份有限公司 Yunnan Chihong Zn&Ge Co., Ltd.	EP	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2018	驰宏资源综合利用有限公司 160t/a 废旧铅酸电池无害化综合回收项目(二期) 还原炉自动化控制项目 Automaticcontrol of reduction furnace for harmless comprehensive recovery of 160t/a waste lead-acid battery project (phase II) of Chihong resources comprehensive utilization Co., Ltd.	云南驰宏资源综合利用有限公司 Yunnan Chihong Resources Comprehensive Utilization Co., Ltd.	EP	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2018	年处理 10 万 t 废旧铅酸蓄电池项目 Project of annual treatment of 100,000 tons of waste lead-acid battery	骆驼集团新疆再生资源有限公司 Camel Group Xinjiang Renewable Resources Co., Ltd.	EP	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2018	整体搬迁升级改造工程全厂自动化 Annual throughput of 100,000 tons of waste lead-acid battery project	河南中原黄金冶炼厂有限责任公司 Henan Zhongyuan Gold Smelter LLC	EPC	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2014	河南佰利联 6 万 t/a 氯化法钛白粉生产线仪表总包项目 EPC of instrument for project of 60,000t/a chlorination process titanium dioxide production line of Henan Billionschem	河南佰利联化学股份有限公司 Henan Billions Chemistry Co., Ltd.	EP	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2014	10 万 t/a 电铅工程全厂自动化 Henan Billionschem Instrument general contracting project of the 60,000t/a chlorination process titanium dioxide production line	赤峰山金银铅有限公司 Chifengshan Au&Ag&Pb Cp., Ltd.	EPC	系统集成与编程 System integration and programming
2014	垣曲冶炼厂处理 500kt/a 多金属矿综合捕集回收技术改造工程自动化控制项目 Automation control of Yuanqu smelter 500kt/a polymetallic ore processing and comprehensive collection & recovery technological upgrading project	北方铜业股份有限公司 North Copper Co., Ltd.	EPC	系统集成与编程 System integration and programming
2014	铅冶炼渣处理技术改造工程自动化控制系统专业承包项目 Automation control system of lead smelting slag treatment technological upgrading project	河南豫光金铅股份有限公司 Henan Yuguang Gold&lead Co., Ltd.	EPC	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2014	新材料项目自动化系统 Automation system of new material project	衢州华友钴新材料有限公司 Huayou Cobalt Co., Ltd.	EPC	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2014	铅锌冶炼工程自动化工程 Automation of Lead and zinc smelting project	呼伦贝尔驰宏矿业有限公司 Hulun Buir Chihong Mining Co., Ltd.	EPC	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2013	提金尾渣综合回收项目全厂自动化工程 Whole plant automation of comprehensive recovery of gold-extracted tailings project	山东恒邦冶炼股份有限公司 Shandong Humon Smelting Co., Ltd.	EPC	系统集成与编程 System integration and programming
2013	铅锌冶炼及冶炼渣综合利用项目全厂自动化 Whole plant automation of lead and zinc smelting and comprehensive utilization of smelting slag project	云南驰宏锌锗股份有限公司 Yunnan Chihong Zn&Ge Co., Ltd.	EPC	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2013	铜冶炼厂全厂自动化承包 Whole plant automation of copper smelter	赞比亚谦比希铜冶炼有限公司 Zambia Chambishi Copper Smelting Co., Ltd.	EP	仪表供货，系统集成与编程 Instrument supply, system integration and programming
2012	铅冶炼工程全厂自动化系统 Automation system for whole pant of lead smelting project	安阳市岷山有色金属有限责任公司 Anyang Minshan Non-ferrous Metal Co., Ltd.	EPC	系统集成与编程 System integration and programming
2012	冶金废铅酸蓄电池低温连续熔炼项目自动化工程 Automation of metallurgical waste lead-acid battery low temperature continuous smelting project	湖北金洋冶金股份有限公司 Hubei Jinyang Metallurgy Co., Ltd.	EPC	仪表供货，系统集成与编程 Instrument supply, system integration and programming

1.2 回转炉电控系统 The rotary furnace electrical control system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2015	阳极炉、保温炉 – 电控系统 Electrical control system of anode furnace and holding furnace	河南中原黄金冶炼厂有限责任公司 Henan Zhongyuan Gold Smelter LLC	EP	系统集成与编程 System integration and programming
2014	阳极炉、转炉电控系统 Electrical control system of anode furnace and converter	五矿铜业（湖南）有限公司 Minmetals Copper (Hunan) Company Limited	EPC	电气、仪表供货，系统集成与编程 Electrical, instrumentation supply, system integration and programming
2014	阳极炉电控系统 Anode furnace electrical control system	赞比亚谦比希铜冶炼有限公司 Zambia Chambishi Copper Smelting Co., Ltd.	EP	系统集成与编程 System integration and programming
2013	阳极炉电控系统 Anode furnace electrical control system	广西金川有色金属有限公司 Guangxi Jinchaun Non-ferrous Metal Co., Ltd.	EP	系统集成与编程 System integration and programming
2012	阳极炉电控系统 Anode furnace electrical control system	云南锡业股份有限公司 Yunnan Tin Company Limited	EPC	电气、仪表供货，系统集成与编程 Electrical, instrumentation supply, system integration and programming

1.3 电炉电控系统 The electrical furnace electrical control system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2015	沉降电炉电控系统 Settling furnace electrical control system	赞比亚谦比希铜冶炼有限公司 Zambia Chambishi Copper Smelting Co., Ltd.	EP	2x6MVA，铜冶炼贫化电炉 2x6MVA, Electric furnace for copper smelting and dilution
2014	镍铁电炉电控系统 Nickel iron furnace electrical control system	广西金源镍业有限公司 Guangxi Jinyuan Nickel industry Co., Ltd.	EP	3x12MVA，镍铁熔炼电炉 3x12MVA, Nickel-iron melting furnace
2014	钒钛磁铁矿电弧炉电控系统 Electrical control system of electric arc furnace for vanadium titanium magnetite	四川龙蟒集团有限责任公司 Sichuan Lomon Group Co., Ltd.	EP	9MVA，钒钛磁铁矿电弧熔炼炉 9MVA, Arc melting furnace for vanadium titanium magnetite
2013	镍铁电炉电控系统 Electrical control system of Vanadium titanium magnetite arc furnace	中国有色矿业集团有限公司 China Nonferrous Metal Mining(Group) Co.,Ltd.	EP	3x24MVA，镍铁熔炼电炉 3x24MVA, Nickel-iron melting furnace
2012	沉降电炉电控系统 Nickel iron furnace electrical control system	大冶有色金属公司集团控股有限公司 Daye Nonferrous Metals Group Holdings Co., Ltd.	FP	2x6MVA，铜冶炼贫化电炉 2x6MVA , Electric furnace for copper smelting and dilution

1.4 钛白粉自动化系统 The titanium dioxide automation system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2019	河南佰利联 10 万 t 钛白粉工程自动化系统 Automation system of Henan Billions 100,000t titanium dioxide project	河南佰利联新材料有限公司 Henan Billions New Material Co., Ltd.	EP	10 万 t/a，氯化法 100,000t/a, chlorination process
2011	云南新立楚雄钛白粉工程自动化系统 Automation system of Henan Xinli Chuxiong titanium dioxide project	云南新立有色金属有限公司 Yunnan Xinli Nonferrous Metals CO., Ltd.	EPC	6 万 t/a，氯化法 60,000t/a, chlorination process

1.5 风机电控系统 The blower fan electrical control system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2011	KKK 风机电控 KKK Blower fan electrical control system	大冶有色金属集团控股有限公司 Daye Nonferrous Metals Group Holdings Co., Ltd.	EP	7600kW，异步电机，固态软启 7600kW, asynchronous motor, solid-state soft start
2010	KKK 风机电控 KKK Blower fan electrical control system	会理昆鹏铜业有限责任公司 Huili Kunpeng Copper Industry Co., Ltd.	EPC	4850kW，同步电机，固态软启 4850kW, synchronous motor, solid-state soft start
2009	KKK 风机电控 KKK Blower fan electrical control system	赞比亚谦比希铜冶炼有限公司 Zambia Chambishi Copper Smelting Co., Ltd.	EP	3750kW，异步电机，水电阻 3750kW, asynchronous motor, water resistance

2. 矿山自动化工程 The Mine Automation Project

2.1 矿山自动化 The mine automation

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2015	谷家台铁矿自动化系统集成及设备供货总承包 Guajiatai iron ore automation system integration and general contracting of equipment supply	莱芜钢铁集团有限公司 Laiwu Iron and Steel Group Co., Ltd.	EP	国内首创地下矿无人远程开采 Pioneering the unmanned remote control mining of domestic underground mine
2015	水银洞金矿预氧化技改工程总承包项目 EPC of technological upgrading of pre-oxidation for Shuiyingdong gold mine	贵州紫金矿业股份有限公司 Guizhou Zijin Mining Group Co., Ltd.	EP	450t/d 采矿 450T/d mining
2015	汝阳钼矿采选自动化系统工程 Automation system of mining and beneficiation of Ruyang molybdenum mine	金堆城钼业股份有限公司 Jinduicheng Molybdenum Co., Ltd.	EP	2 万 t/d 20,000 t/d
2013	利比里亚邦铁矿项目自动化系统工程 Automation system of iron ore mine project in Bong, Liberia	武钢中非（香港）矿业有限公司 Wuhan Iron and Steel Sino-Africa (HongKong) Mining Co., Ltd.	EP	100 万 t/a 铁选厂 1million t/a of iron ore concentrator

2.2 矿井提升机系统 The mine hoist system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2015	谷家台铁矿主副井提升机自动化系统 Automation system of main and auxiliary shaft hoist for Gujiatai iron ore mine	莱芜钢铁集团莱芜矿业有限公司 Laiwu Iron and Steel Group Co., Ltd.	E	主井双箕斗，直流 1800kW，副井罐笼－平衡锤，直流 1000kW 1000kW Main shaft and double skips, DC 1800kW, auxiliary shaft and cage-balance hammer, DC 1000kW
2015	二矿区主副井提升机自动化系统 Automation system of main and auxiliary shaft hoist in No.2 mine area	金川集团股份有限公司 Jinchuan Group Co., Ltd.	EPC	罐笼－平衡锤，直流 800kW Cage-balance hammer, DC 800kW
2014	龙首矿主副井提升机自动化系统 Automation system of main and auxiliary shaft hoist of Longshou mine	金川集团股份有限公司 Jinchuan Group Co., Ltd.	EPC	罐笼－平衡锤，直流 800kW Cage-balance hammer, DC 800kW
2011	西矿体中央主副井提升机自动化系统 Automation system of central main and auxiliary hoist of west orebody	中色非洲矿业有限公司 NFC Africa Mining PLC (NFCA)	EPC	罐笼－平衡锤，直流 318kW Cage-balance hammer, DC 318 kW
2011	BALUBA 铜矿主副井提升机自动化系统 Automation system of main and auxiliary shaft hoist of BALUBA copper mine	中色非洲矿业有限公司 NFC Africa Mining PLC (NFCA)	EPC	罐笼－平衡锤，直流 2100kW Skip and cage-balance hammer, DC 2100kW
2010	杜达铅锌矿混合井提升机自动化系统 Main shaft hoist automation system of Duda lead-zinc mine	中国冶金科工集团有限公司 China Metallurgical Group Corporation	EPC	箕斗－罐笼，直流 1000kW 1000kW Skip-cage, DC 1000kW

2.3 选矿自动化系统 The beneficiation automation system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	西藏玉龙铜矿改扩建工程选矿厂总包项目 EPC of concentrator renovation and expansion of Tibet Yulong copper mine	西部矿业集团有限公司 Western Mining Group Co., Ltd.	EPC	1800 万 t/a 18 million t/a
2017	大坪选矿车间自动化技改项目 Automation technological renovation of Daping beneficiation plant	云南华联锌铟股份有限公司 Yunnan Hualian Zinc & Indium Stock Co., Ltd.	EP	60 万 t/a 600,000 t/a
2015	牦牛坪稀土矿选矿厂自动化系统 Automation system of concentrator of Maoniuping rare earth mine	四川江铜稀土有限责任公司 Sichuan JCC Rare Earth Metals Co., Ltd.	EPC	采选规模为 4200t/d 稀土矿石 The mining and beneficiation capacity is 4,200 t/d of rare earth ore
2013	都龙矿区选矿扩建工程全厂自动化系统 Whole plant automation system of concentrator expansion project of Dulong mine area	云南华联锌铟股份有限公司 Yunnan Hualian Zinc & Indium Stock Co., Ltd.	EP	8000t/d 多金属选矿，工艺复杂 8000t/d of polymetallic beneficiation, complex process

2.4 充填自动化系统 The filling automatic system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	刚果金森达矿山充填系统 Filling system of KINSENDA mine	金川国际 Metorex 公司 Jinchuan International Metorex Company	EPC	两套全尾砂充填搅拌系统 Two sets of full-tailings filling and agitation
2018	会泽矿业膏体充填智能升级改造项目 Intelligent upgrading and renovation of paste filling in Yunnan Chilong Zinc&Germanium Co., Ltd	云南驰宏锌锗股份有限公司 Yunnan Chilong Zinc&Germanium Co., Ltd.	EPC	膏体充填一体化智能管控平台 Intelligent management and control platform for integrated paste filling
2013	白象山铁矿充填自动化系统 Automation system of iron ore filling in Baixiangshan	马鞍山钢铁股份有限公司 Magang (Group) Holding Co., Ltd.	EP	四套全尾砂充填搅拌系统 Four sets of full tailings filling and agitation system,
2012	修水炉山钨业充填自动化系统 Filling automation system of Jiangxi Xiushui Xianglushan Tungsten LLC	中国五矿集团公司 China Minmetals Corporation	EPC	两套全尾砂充填搅拌系统 Two sets of full-tailings filling and agitation
2010	崇礼紫金矿业充填自动化系统 Filling automation system of Zijin Mining Group Co., Ltd in Chongli	紫金矿业集团股份有限公司 Zijin Mining Group Co., Ltd.	EP	两套全尾砂充填搅拌系统 Two sets of full-tailings filling and agitation
2009	山东华泰煤矿充填自动化系统 Filling automation system of Shandong Huatai Coal Mining Company Limited	新汶矿业集团公司 Xinwen Mining Group Co., Ltd.	EP	煤矸石充填搅拌系统 Coal gangue filling and agitation system
2008	河北通顺煤矿充填自动化系统 Coal filling automation system in Tongshun, Hebei province.	冀中能源集团有限责任公司峰峰矿业集团 Fengfeng Mining Group of Jizhong Energy Group Co., Ltd.	EP	煤矸石充填搅拌系统 Coal gangue filling and agitation system

2.5 无人驾驶电机车运输系统 The filling automatic system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	红牛铜矿无人驾驶电机车运输系统 Transportation System with Driverless Electric Locomotive of Hongniu Copper Mine	云矿红牛矿业有限公司 Yunkuang Hongniu Mining Company Limited	EPC	4047 米主平硐 Main Adit at 4047m
2018	冬瓜山铜矿无人驾驶电机车运输项目 Transportation Project with Driverless Electric Locomotive of Dongguanshan Copper Mine	铜陵有色金属集团控股有限公司 Tongling Nonferrous Metals Group Holdings Co., Ltd.	EPC	-1000 米运输中段 Haulage level at -1000m
2016	赞比亚谦比希主、西矿体中段无人驾驶电机车运输项目 Transportation Project with Driverless Electric Locomotive in the Level of Main Orebody and West Orebody in Chambishi, Zambia	中色非洲矿业有限公司 NFC Africa Mining PLC (NFCA)	EPC	500 米中段 Level 500m
2013	冬瓜山铜矿无人驾驶电机车运输项目 Transportation Project with Driverless Electric Locomotive of Dongguanshan Copper Mine	铜陵有色金属集团控股有限公司 Tongling Nonferrous Metals Group Holdings Co., Ltd.	EPC	-875 米运输中段 Haulage level at -875m

2.6 尾矿库闭库和监测系统 Tailings pond closure and monitoring system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2016	铜街大沟尾矿库监测系统 Tailings Pond Monitoring System in Dagou, Tongjie	江西铜业集团公司 Jiangxi Copper Corporation Limited	EP	闭库和多点在线监测 Closure of Tailings Pond and Multi-point on-line monitoring
2016	新田尾矿库监测系统 Tailings Pond Monitoring System in Xintian	江西铜业集团公司 Jiangxi Copper Corporation Limited	EP	闭库和多点在线监测 Closure of Tailings Pond and Multi-point on-line monitoring
2013	都龙矿区选矿扩建工程尾矿库监测系统 Tailings Pond Monitoring System of the Expansion Project of Mineral Processing Plant in Dulong Mine Area	云南华联锌铟股份有限公司 Yunnan Hualian Zinc & Indium Stock Co., Ltd.	EP	多点在线监测 Multi-point on-line monitoring
2012	选矿厂第三尾矿库监测系统 Monitoring System of No.3 Tailings Pond of the Concentrator	金川集团股份有限公司 Jinchuan Group Co., Ltd.	E	多点在线监测 Multi-point on-line monitoring
2012	玉龙铜矿搅拌浸出工程尾矿库监测系统 Monitoring System of Tailings Pond of the Agitation Leaching Project of Yulong Copper Mine	西藏玉龙铜业股份有限公司 Tibet Yulong Copper Co., Ltd.	E	多点在线监测 Multi-point on-line monitoring
2008	滥泥坪公司猴跳岩尾矿库闭库和监测系统 Closure and Monitoring System of Tailings Pond in Houtiaoyan of Lannijing Company	云南金沙矿业有限公司 Yunnan Jinsha Mining Co., Ltd.	E	闭库和多点在线监测 Closure of Tailings Pond and Multi-point on-line monitoring

3. 电力及能源工程 The Power and Energy Project

3.1 光伏工程 The photovoltaic project

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	沈阳机床 36MWp 屋顶分布式并网光伏电站 36MWp roof distributed grid-connected photovoltaic power station in Shenyang Machine Tool Co., Ltd	沈阳拓源沈机新能源有限公司 Shenyang Tuoyuan Shenji New Energy Co., Ltd.	EPC	36MWp
2017	北方重工 30MWp 屋顶分布式并网光伏电站 30MWp roof distributed grid-connected photovoltaic power station in Northern Heavy Industry Group	沈阳拓源北重新能源有限公司 Shenyang Tuoyuan Shenji New Energy Co., Ltd.	EPC	30MWp
2017	赞比亚 CEC30MWp 并网光伏电站 30MWp Grid-connected photovoltaic power station of CEC in Zambia	赞比亚铜带省能源公司 Zambia Copperbelt Energy Corporation	E	30MWp
2016	山西偏关 2X400kWp 村级光伏扶贫电站 2X400kWp photovoltaic power station of village-level poverty alleviation project of Pianguan, Shanxi	偏关县扶贫开发办公室 Pianguan County Poverty Alleviation and Development Office	EPC	800kWp
2016	浙江嘉善白鱼荡 50MWp 渔光互补光伏电站 50MWp fishery-solar hybrid power station of Baiyudang, Jiashan county, Zhejiang	嘉兴德源节能科技有限公司 Jiaxing Deyuan Energy Saving Technology Co., Ltd.	E	50MWp
2015	抚宁中硅傍水崖 20MWp 并网光伏电站 20MWp grid-connected photovoltaic power station of SINOSICO in Bangshuiya, Funing	抚宁中硅清洁能源有限公司 Funing SINOSICO Clean Energy Co., Ltd.	EPC	20MWp
2015	内蒙古额济纳旗 30MWp 并网光伏电站 30MWp grid-connected photovoltaic power station in Ejin Banner, Inner Mongolia	额济纳旗恩菲新能源有限公司 Ejin Banner ENFI New Energy Co., Ltd.	EPC	30MWp

3.2 风电工程 The wind power project

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	齐齐哈尔分散式风电工程 Qiqihar decentralized wind power project	齐齐哈尔市发展和改革委员会 Qiqihar City Development and Reform Commission	E	317MW
2018	黑龙江讷河分散式风电工程 Decentralized wind power project in Nehe, Heilongjiang	讷河市发展和改革局 Nehe City Development and Reform Bureau	E	82.5MW
2014	宁夏中卫香山风电产业园 Xiangshan wind power industrial park in Zhongwei, Ningxi	中卫市发展和改革委员会 Zhongwei City Development and Reform Commission	E	50MW

3.3 综合能源系统 The integrated energy system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2019	南太湖产业聚集区长兴分区综合能源站项目 Integrated energy station project in Changxing subarea of Nantaihu industrial cluster area	国网浙江综合能源服务有限公司 State Grid Zhejiang Integrated Energy Service Co., Ltd.	E	项目业综合能源服务 Integrated energy service
2018	巴布亚新几内亚爱尔兰省光储柴微电网项目 PV-Diesel-BESS microgrid project in Ireland of Papua New Guinea	巴布亚新几内亚新爱尔兰省政府 New Ireland Provincial Government of Papua New Guinea	E	光伏 + 风电 + 柴油 + 储能 Photovoltaic power + wind power + diesel power + energy storage
2017	偃师光储柴微电网发电项目 Yanshi PV-Diesel-BESS microgrid project	中国恩菲研究院偃师基地 China ENFI Research Institute Yanshi Base	E	光伏 + 风电 + 柴油 + 储能 Photovoltaic power + wind power + diesel power + energy storage

3.4 新能源与环境保护工程 The new energy and environmental protection project

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	河南偃师尾矿库闭库生态恢复示范课题项目 Tailings pond closure ecological restoration demonstration project in Yanshi, Henan	中国恩菲研究院偃师基地 China ENFI Research Institute Yanshi Base	E	光伏 + 土壤修复 + 生态恢复 Photovoltaic power + soil restoration + ecological restoration
2017	西部矿业锡铁山尾矿库 50MWp 光伏闭库及生态治理项目 50MWp photovoltaic closure and ecological treatment project of Xitieshan tailings pond	西部矿业股份有限公司锡铁山分公司 Western Mining Corporation Xitieshan Branch	E	闭库 +50MWp 光伏 + 生态恢复 Closure +50MWp photovoltaic power + ecological restoration

3.5 发输变电工程 The power generation, transmission and transformation project

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2015	110kV 总降变电站 110kV general step-down substation	东营鲁方金属材料有限公司 Dongying Lufang Metal Materials Co., Ltd.	E	主变 3x63MVA Main transformer 3x63MVA
2013	220kV 总降变电站 220kV general step-down substation	呼伦贝尔驰宏矿业有限公司 Hulun Buir Chihong Mining Co., Ltd.	EPC	整流 3x60MVA 动力 2x31.5MVA Rectifier 3x60MVA Power 2x31.5MVA
2012	220kV 总降变电站 220kV general step-down substation	云南驰宏锌锗股份有限公司 Yunnan Chihong Zn&Ge Co., Ltd.	EPC	整流 3x40MVA 动力 2x40MVA Rectifier 3x40MVA Power 2x40MVA

4. 信息及软件集成 The Information and Software Integration

4.1 企业生产管理系统 The enterprise production management system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2018	洛阳中硅高科技有限公司生产信息管控系统 Production Information Management and Control System of Luoyang SINOSICO High-Tech Co., Ltd.	洛阳中硅高科技有限公司 Luoyang SINOSICO High-Tech Co., Ltd.	EP	生产管理系统 Production management system
2018	五矿有色金属控股有限公司锌项目生产管理系统 Production Management System of Zinc Project of China Minmetals Nonferrous Metals Co., Ltd.	五矿有色金属控股有限公司 China Minmetals Nonferrous Metals Co., Ltd.	EPC	生产管理系统 Production management system
2017	谦比西东南矿体自动化信息化融合控制系统 Automation and Information Control System of Chambishi Southeast Orebody	赞比亚谦比希铜冶炼有限公司 Zambia Chambishi Copper Smelting Co., Ltd.	EP	生产管理系统 Production management system
2016	谦比西主、西矿体自动化及电能管控改造项目 Renovation Project of Automation and Power Control of Chambishi's Main Orebody and Western Orebody	赞比亚谦比希铜冶炼有限公司 Zambia Chambishi Copper Smelting Co., Ltd.	EP	生产管理系统 Production management system

4.2 信息化智能化系统 Information and intelligent system

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2015	恩菲科技大厦 B 座智能化工程项目 Intelligent Project of Building B of ENFI Technology Building	中国恩菲工程技术有限公司 China ENFI Engineering Corporation	EPC	楼宇智能化 Building intelligence
2014	中原黄金冶炼厂视频及安防监控工程 and security monitor project of Zhongyuan gold smelter	河南中原黄金冶炼厂有限责任公司 Henan Zhongyuan Gold Smelter LLC	EPC	全厂视频监控、安全防范系统 Plant-wide video surveillance and security system
2014	衢州华友冶炼厂视频监控系统工程 Video surveillance project of Huayou smelter in Quzhou	衢州华友钴新材料有限公司 Quzhou Huayou Cobalt New Material Co., Ltd.	EP	视频监控系统 Video surveillance system

5. 智能装备集成制造 The Intelligent Equipment Integration Manufacturing

时间 Time	项目名称 Project Name	项目业主 Project Type	项目类型 Project Type	项目特征 Project Characteristic
2019	16 万 t/a 废旧铅酸蓄电池项目总承包合同 160,000t/a Waste lead-acid battery project	骆驼集团新疆再生资源有限公司 Camel Group Xinjiang Renewable Resources Co., Ltd.	EP	设备集成制造 Equipment integration manufacturing
2018	五矿盐湖电控装备供货项目 Electronic control equipment supply project of Minmetals salt lake co., Ltd.	五矿盐湖有限公司 China Minmetals Salt Lake Co., Ltd.	EP	设备集成制造 Equipment integration manufacturing
2018	工业废水处理项目电控装备供货 Supply of electronic control equipment for industrial wastewater treatment project	安陆市经济开发区工业污水处理厂 Anlu Economic Development Zone Industrial Wastewater Treatment Plant	EP	设备集成制造 Equipment integration manufacturing
2018	中冶曹妃甸三元前驱体项目电控装备供货 Supply of electronic control equipment for Caofeidian ternary precursor project of MCC	中冶瑞木新能源科技有限公司 MCC Ruimu New Energy Technology Co., Ltd. Treatment Plant	EP	设备集成制造 Equipment integration manufacturing

七、业务优势和战略伙伴 / Business Advantages and Strategic Partners

1. 业务优势 Business Advantages

唯一性 —— “六位一体”的全产业链服务模式
The Uniqueness —— the “six in one” service mode for the whole industry chain

集投资、咨询设计、装备集成制造、工程、运维和评估检测于一体的综合服务商，为客户提供系统化的整体解决方案。

It is an integrative service provider which integrates investment, consultation design, integrated manufacturing of equipment, engineering, operation & maintenance, and evaluation & testing, providing the customers with systematic total solutions.

独有性 —— 出色的 EPC 总承包能力
The Exclusiveness —— excellent EPC capability

拥有 60 多年工程承包经验，项目管理模式、程序、方法、标准与国际接轨，具有完备的组织架构，强大的供应商及工程造价数据库信息，提供国际一流的工程服务。

ENFI has more than 60 years experience of project contracting, and the project management mode, procedures, methods and standards are in line with the international standards. Relying on complete organizational structure, as well as powerful supplier and engineering cost database, ENFI can provide world-class engineering services.

先进性 —— 领先的技术实力
The Advancement —— leading technical strength

掌握多项专长技术，拥有国家重点实验室、工程技术中心等多个创新平台，承担多项国家“863 计划”课题研究，获得省部级奖项 30 余项，占据国内自动化和新能源技术研究及应用领域制高点。

ENFI holds in hand quite a lot of expertise technology, boasts many of its innovation platforms such as the national key laboratory, the engineering technology center and so on, which have undertaken many research projects in the national "863 plan" , have been awarded with 30 provincial prizes, and have occupied the commanding heights of the domestic research and application fields of automation and new energy technology.

智能化 —— 高超的装备制造水平
The Intelligence —— excellent equipment manufacturing level

拥有各类生产设备 200 台，较强生产组织能力，严谨的质量管控体系，具备年产 2000 面配电柜生产能力。

With 200 production equipment of all kinds, strong production organization capability and strict quality control system, ENFI has the annual production capacity of 2,000 power distribution cabinets.

2. 业务分布 The Business Distribution

中国恩菲已在 30 多个国家和地区建设了 1.2 万个工程项目。
ENFI has helped build over 12,000 projects in more than 30 countries and regions all over the world.

恩菲业务点 The ENFI business spots

3. 恩菲电气智能技术公司战略合作伙伴 The Strategic Partners of ENFI Electrical Intelligent Technology Company

中国五矿

MCC 中国恩菲

恩菲电气智能技术公司
ENFI Electrical Intelligent Technology Company

地址:北京市复兴路12号
Add:12 Fuxing Avenue,Beijing,China

传真\Fax:+86-10-63936329
网址\http:www.enfi.com.cn

电话\Tel:+86-10-63936327

关注了解更多