中国五矿

MCC 中国恩菲

Non-Coal Mines

Turn a stone of resource into a gem of undertaking

Company Profile

Founded in 1953, China ENFI Engineering Co., Ltd., i.e., China ENFI Engineering Corp. (formerly known as China Non-ferrous Engineering and Research Institute, hereinafter referred to as "China ENFI"), is the first national professional design institution set up after the founding of the People's Republic of China with the mission to revive and develop the country's non-ferrous metals industry. Now a subsidiary of China Minmetals Corporation and MCC Group, both Fortune Global 500 companies, China ENFI is the only one company in China's nonferrous engineering and consulting industry holding both the Class A Engineering Design Integrated Qualification and Class A Integrated Credit Rating for Engineering Consulting Unit.

For more than 70 years, China ENFI has been involved in over 12,000 engineering projects in more than 30 countries and regions. Rooted in non-ferrous mining and metallurgy, driven by technological innovation, and specializing in high-end consulting, China ENFI has developed three major business sectors: scientific research, engineering services, and industrial investment, and has a strong presence in nine business lines, namely non-coal mines, non-ferrous metallurgy, water services, energy and environment, advanced new materials, urban infrastructure and tourism, urban mineral resources, intelligent equipment, and real estate management. With its versatility and core competitiveness, China ENFI can provide services throughout a project life cycle: EPC, project management, engineering consultation, design, cost estimation, construction supervision, environmental evaluation and product supply, etc., and possesses capabilities throughout a project value chain, from consultation, design, construction, to investment and operation.

As a technology leader in the industry, China ENFI boasts a high-quality engineering design team covering more than 40 engineering disciplines including geology, mining, mineral processing, tailings, metallurgy, architecture, structure, electrical, thermal engineering supplemented by utility and auxiliary facility engineering, on top of which is a talent and expert team made up of academicians of the Chinese Academy of Engineering and many national and industry-level design masters, and more than one hundred Ph.D.'s. China ENFI has set up an all-discipline technological R&D platform, and possesses 3 national platforms including National Engineering Research Center for Silicon Materials Preparation Technology, etc., 1 academician & expert workstation, 2 post-doctoral research stations, ENFI Research Institute, Mining Economy Research Institute, MCC Low-Carbon Technology Research Institute, Yanshi R&D Base and 18 provincial and ministerial level platforms. Relying on the "3331815" (3 national platforms, 3 stations, 3 institutes, 18 provincial and ministerial platforms, 1 base, 5 co-development and innovation platforms) R&D platforms, China ENFI has created a large number of technological innovations with high market value, won more than 1400 awards at the national, provincial and ministerial levels, and obtained more than 3000 granted patents with invention patents accounting for about 60%, leading the industry towards a sustainable intelligent, eco-friendly and green development.

Guided by China’s industrial strategies, China ENFI is accelerating its transformation towards a digitalized, data-driven, international company with vast networks. As China's national team in non-ferrous mining and metallurgy, the vanguard of environmental protection, and a pioneer in emerging industries, China ENFI always builds its strength on technology and quality, making unremitting contributions to the growth and upgrade of the industry, and aims to become the most trustworthy international engineering service provider and energy and environmental business developer.

Qualifications

Engineering Design Qualification Certificate (Class A)

Class A Engineering Consultancy Credential

Class A Engineering Consultancy Credential

China ENFI is the only unit that boasts "Double Class A integrated Qualifications" in the non-ferrous engineering consulting and design industry of China. It owns Class A Engineering Design Integrated Qualification (the first in the non-ferrous metals industry) and Class A Engineering Consultancy Credential. It can undertake all levels of construction project, planning consultation, evaluation consultation and engineering design in the whole industry, and provide full-process services such as construction project general contracting, project consultation and management within the scope of qualification certificates.

Class A Integrated Credit Rating for Engineering Consulting Unit

Qualification Certificate for General Contracting of Mine Engineering Construction (Class B)

Foreign Project Contracting Business Qualification of the People's Republic of China

High-tech Enterprise Certificate

National Awards Obtained in Recent Years

Overview of the National Awards ENFI Won in Recent Years


国家科学技术进步奖
证 书
为表彰国家科学技术进步奖获得者，特颁发此证书。
项目名称：复杂难处理镍钴资源高效利用关键技术与应用
奖励等级：一等
获 奖 者：中国恩菲工程技术有限公司
证书号：2012-J-215-1-01-002


国家科学技术进步奖
证 书
为表彰国家科学技术进步奖获得者，特颁发此证书。
项目名称：金川镍矿高应力特大型矿床连续开采综合技术
奖励等级：二等
获 奖 者：中国恩菲工程技术有限公司
证书号：2012-J-252-2-14-003

National Science and Technology Progress Award:

- Key Technologies and Application of Efficient Utilization of Refractory Nickel and Cobalt Resource
- Comprehensive Technologies for Continuous and Efficient Mining of the Ultra-Large and High-Stress Deposits of Jinchuan Nickel Mine
- R&D and Application of Key Technologies for Safe and Efficient Mining of Deep and Refractory Copper Deposits
- Hazard-Free Mining Technologies for Metallic Mineral Deposits
- R&D on the New Process for High-Level Intensified Underground Mining·Research
- Industrial Application of New Technologies on Paste Filling


2016-2017年度国家优质工程奖。
特发此证。


国家工程建设质量奖审定委员会审定，荣获二〇一七年度国家优质工程银质奖。特发此证。以资鼓励。


2016-2017年度国家优质工程奖。
特发此证。


證 書
中国恩菲工程技术有限公司
你单位和金诚信矿业管理股份有限公司、云南建工集团有限公司联合承建的老挝东泰钾盐矿验证工程荣获2014－2015年度中国建设工程鲁班奖(境外工程)
特发此证

National Quality Engineering Award:

- 8kt/d Concentrator Expansion Project of Dulong Mine of Yunnan Hualian Zinc & Indium Stock Co., Ltd.— Main Plant Building Construction
- Comprehensive 20kt/a Pb-Zn Resource & Utilization, Environmental Protection & Energy Saving Processing Technology Modification of Yunnan Chihong Zinc & Germanium Co., Ltd.
- Tagaung Taung Nickel Mine, Myanmar
- Dongtai Potash Mine Verification Project, Laos (EPC)

National Excellent Engineering Design Award:

- Sanshandao Gold Mine Deep Mining
- Dexing Copper Mine Phase 3 of Jiangxi Copper
- Tonglvshan Copper-Iron Ore Phase 2 Deep Mining
- Shandong Yingezhuang Gold Mine Modification and Expansion, Zhaoyuan, Shandong

National Award for Consultancy Excellence:

- Feasibility Study of Resuming Construction of Chambishi Copper Mine, Zambia
- Feasibility Study of Tagaung Taung Nickel Mine, Myanmar
- Feasibility Study of Dongtai Potash Deposit Mining Project, Laos
- Feasibility Study of Efficient Recovery and Comprehensive Utilization of Platinum Group Metals Associated with Copper-Nickel Ore of Jinchuan Group Co., Ltd.
- Feasibility Study of Chalukou Molybdenum-Lead-Zinc Polymetallic Mine in the Greater Khingan Range

Patents

Since the establishment of the company, by the end of 2023, a total of over 2000 authorized patents have been obtained, of which nearly 400 are related to mining. The proportion of invention patents is approximately 40%, covering disciplines such as geology, mining, shaft construction, rock mechanics, mining machinery, mineral processing, and tailings. Some of the patents are listed in the table below.

List of Part of Authorized Mining Invention Patents (as of 2023)

A Method for Collecting Acidic Water from Waste Dumps (CN202110960075.4)
Microseismic Source Location Method, System, Equipment, and Storage Medium (CN202110613143.X)
Block Caving (CN201910911544.6)
Deep-shaft Open Stoping with Post Filling (CN201610306126.0)
Flotation Separation Method for Pyrrhotite in High Altitude Environments (CN202110557100.4)
Method for Processing Ultra-Lean Magnetite Ores (CN201810887314.6)
Center-line Embankment Tailings Dam (CN201910616141.9)
A Type of Energy Dissipation Orifice Plate (CN200910082367.1)
Composite Belt for Mine Hoisting (CN201910406973.8)
Tailings Bin (CN201610187510.3)

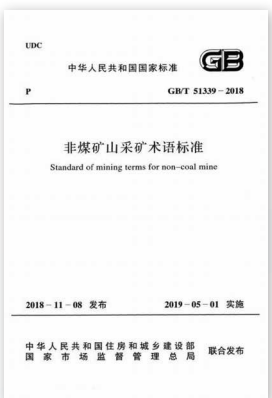
Innovation in Standardization

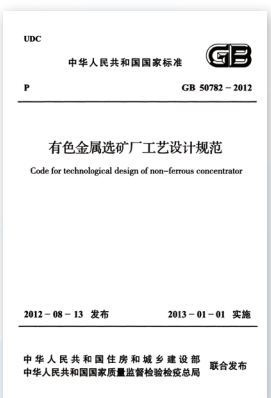
Since 1984, China ENFI Engineering Corporation has been the secretariat for the "China Nonferrous Metals Industry Construction Engineering Standardization Administration Office," which is the technical standard authority for construction projects in the nonferrous industry. ENFI is responsible for compiling and updating the nonferrous construction engineering standard system, proposing policies and measures for standardization work in its professional field to national standardization authorities, and has organized the formulation of over 200 standards and specifications, covering four major areas: surveying and engineering exploration, nonferrous metal mines, nonferrous metal smelting and processing, and utilities, thus providing a set of rules for the construction of nonferrous metal industry projects. The formulation, revision, and implementation of these standards and specifications have played a significant role in promoting energy conservation, environmental protection, rational resource utilization, and ensuring the quality and safety of engineering projects. China ENFI has long contributed to enhancing the standardization level of the industry, promoting national standardization reform and innovation, and supporting the high-quality development of the industry.

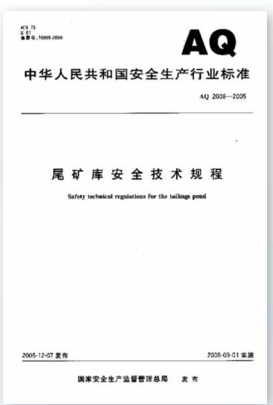
Part of the Standards in Mining Sector Chief-edited by China ENFI as the Primary Drafting Entity

S/N	Description	Type	Code
1	Code for Energy Conservation Design of Non-Ferrous Metal Mines	Chinese national standard	GB50595-2010
2	Mine Drawing Standard for Metal and Nonmetal Mines	Chinese national standard	GB/T50564-2010
3	Code for Design on Fire Prevention of Non-ferrous Metals Engineering	Chinese national standard	GB50630-2010
4	Code for Technological Design of Non-Ferrous Concentrator	Chinese national standard	GB50782-2012
5	Code for Design of Tailings Facilities	Chinese national standard	GB50863-2013
6	Design Document Preparation Standard of Construction Project for Non-ferrous Mine	Chinese national standard	GB/T50951-2013
7	Code for Design of Underground Opening of Non-ferrous Metals Mine	Chinese national standard	GB50915-2013
8	Load Code of Non-ferrous Metals Engineering Structures	Chinese national standard	GB50919-2013
9	Technical Code for Equipment Foundation of Non-ferrous Metals Engineering	Chinese national standard	GB51084-2015

10	Code for Design of Measurement and Control of Non-ferrous Metals Mines	Chinese national standard	GB/T51196-2016
11	Standards for Non-coal Mine Mining Terminologies	Chinese national standard	GB/T51339-2018
12	Safety Regulations for Metal and Nonmetal Mines	Chinese national standard	GB16423-2020
13	Safety Regulations for Tailings Pond	Chinese national standard	GB39496-2020
14	Code for Design of Water-conservation for Nonferrous Metal Enterprises	Chinese national standard	GB51414-2020
15	Code for Design of Non-ferrous Metals Mines	Chinese national standard	Review
16	General Specifications for Metal and Nonmetal Mine Engineering	Chinese national standard	Review
17	Standards for Nonferrous Industry Engineering Terminology	Chinese national standard	(Draft for comments)
18	Tailings Facilities Technical Standards	Chinese national standard	(Draft for comments)







Major Scientific Research Topics and Achievements

In recent years, China ENFI has undertaken key special projects of the "13th Five-Year Plan," such as "Key Technologies for Large-tonnage Lightweight Hoisting Containers and Traction," "Ventilation Safety Guarantee Technology for Mines in High-altitude and Cold Regions," and "Research and Demonstration of Integrated Application of Multiple Innovation Methods for Deep Metal Mineral Resource Development," achieving a series of technical results in large-tonnage deep shaft hoisting, large-scale mining of gently-inclined ore bodies, paste filling, and construction of deep vertical shafts. Additionally, China ENFI has completed several significant research projects, including the "Ultra-large Capacity and Ultra-deep Mining" and "1025" special projects.

List of Part of Scientific Research Projects Undertaken by China ENFI in Recent Years

National Key Research and Development Program of the 14th Five-Year Plan

Deep Large-Panel Non-Pillar Continuous Mining Technology and Equipment for Metal Mines

R&D of Dynamic Precision Monitoring and Advanced Proactive Treatment System for Tailings Pond Water Level

National Key Research and Development Program of the 13th Five-Year Plan

Research on Key Technologies of Large-tonnage Lightweight Hoisting Container and Traction (Topic)

Safety Guarantee Technology of Mine Ventilation in High-altitude and Alpine Area (Topic)

Optimization Technology for Large Mining Section and Multi-Mining Area Stoping Systems and Engineering Structures in Deep Ore Deposits (Sub-topic)

Efficient and Synergistic Paste filling Technology for Deep Metal Mines (Sub-topic)

Risk Analysis Theory and Optimized Design Methods for Deep Vertical Shaft Construction Engineering (Sub-topic)

Design Theory and Methods of Shaft Wall Structure under Coupled Action of High Stress, High Ground Temperature, and High Permeability Pressure (Sub-topic)

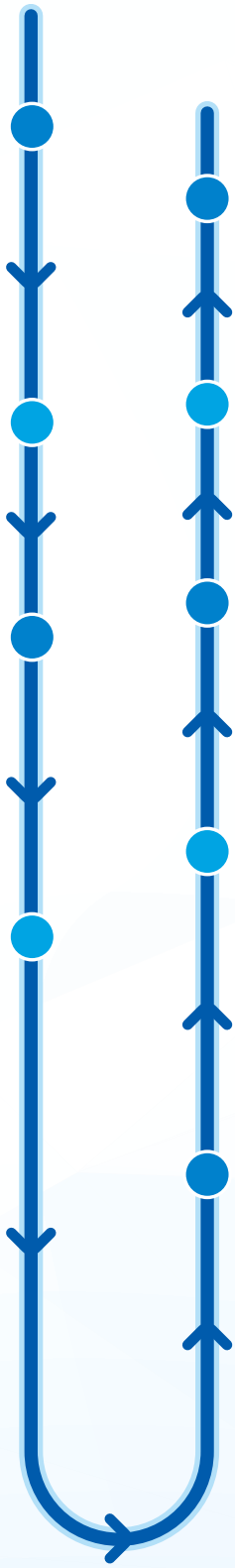
Intelligent Data Acquisition and Integration Technology of Mining Process and Equipment in Metal Mine (Topic)

Data-driven Intelligent Precision Control Technology for Metal Mine Paste Filling (Sub-topic)

National Technical Platform for Disaster Early Warning, Prediction and Emergency Support of Tailings Pond

Scope of Mining Business

ENFI provides full-process, full-lifecycle services for non-coal mining engineering projects.



Resource exploration

- Quality management and consultation for mineral resources exploration
- Resources estimation

Due diligence

- Due diligence survey for resource project

Early-stage study

- Mining process study
- Rock mechanics study
- Metallurgical test study
- Backfilling test study

Project approval stage

- Project proposal/pre-feasibility study report
- Feasibility study report
- Project application report
- Mineral resources development and utilization solutions
- EIA report
- Energy conservation evaluation report
- Geological environmental protection and land rehabilitation scheme for mines
- Risk analysis report on social stability

Carbon assessment

- Carbon emission estimation and analysis
- Measures and suggestions for carbon emission reduction

Monitoring and remediation

- TSF/waste dump/heap leaching yard/side slope safety monitoring
- Soil/environment/ecosystem

Closure and rehabilitation stage

- TSF closure and rehabilitation
- Waste dump rehabilitation
- Heap leaching yard rehabilitation
- Industrial site rehabilitation

Production stage

- Mining and mineral processing operation and maintenance services
- Backfilling operation and maintenance services
- Intelligent mine operation and maintenance services

Project Execution stage

- Basic engineering design
- Mining safety facilities design
- Mineral processing safety facilities design
- TSF safety facilities design
- Detailed engineering design
- EPC/EPCM/PMC
- EPC contracting of intelligent mine system
- Remote control and automation modification

Talents

1 Academician of China Academy of Engineering

2 National Engineering Survey and Design Masters

3 Fellows of the Australasian Institute of Mining and Metallurgy (FAusIMM)

1 Candidate for the National Hundred, Thousand and Ten Thousand Talents Plan

6 National Nonferrous Industry Design Masters

7 JORC/Competent Persons

Over 500 professionals

Over 50% employees with senior titles

Over 60% employees with master's degrees or above

Yu Runcang
Academician of Chinese Academy of Engineering

Yu Changshun
National Design Master in Geotechnical Survey and Engineering Design

Chen Dengwen
National Design Master in Geotechnical Survey and Engineering Design

Liu Yuming
China Minmetals Chief Technical Expert, National Design Master in Nonferrous Industry, FAusIMM

Deng Chao'an
Deputy Chief Engineer of ENFI
National Design Master in Nonferrous Industry, FAusIMM

Qi Baoming
National Design Master in Nonferrous Industry

Wei Hongxing
National Design Master in Nonferrous Industry

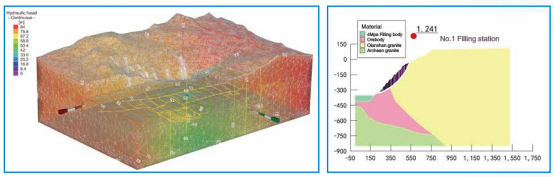
Zhu Weigen
National Design Master in Nonferrous Industry

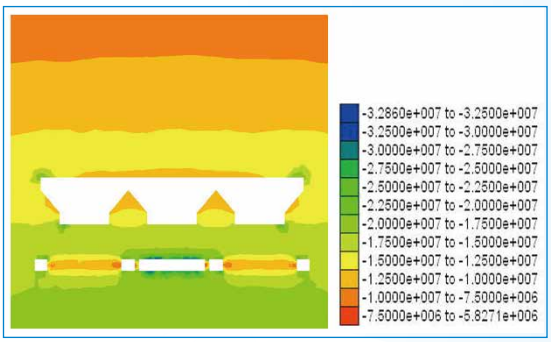
Zheng Xuexin
National Design Master in Nonferrous Industry

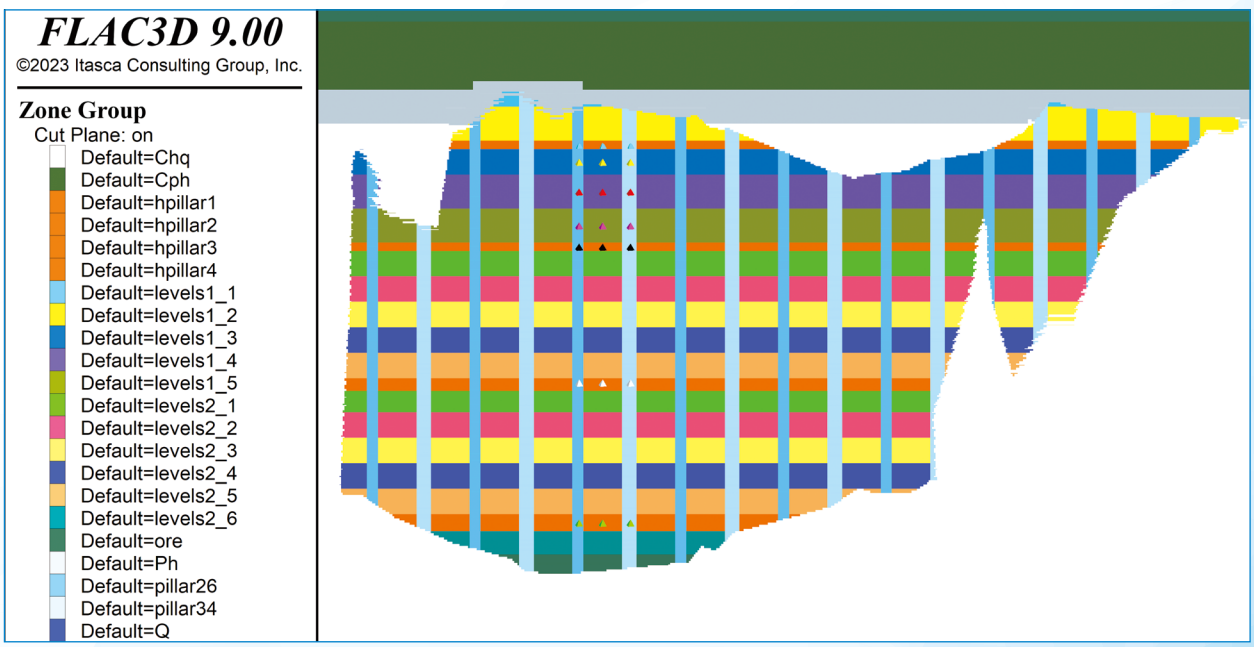
Advanced Design Tools

- Mine digital design platform – MIM.Design
- 3D design – Bentley mircostation
- Geostatistical/modeling parameter calculation software – Snowden Supervisor
- Geology and mining software – Datamine/Surpac
- Underground mine design and mining scheduling software – UG/5DP/EPS/MINESCHED
- Open-pit mining limit optimization program – NPV software package/Whittle
- Prediction software of ore fragment size of the block-caving method – BCF
- Block caving management optimization and ore drawing software – PC – BC
- Stability calculation software – FLAC3D/Midas
- Underground mining ventilation simulation calculation software – Ventsim/Vuma
- Slope stability analysis software – SLOPE/W
- Mineral processing process flow calculation software – METSIM
- Comminution process flow simulation software – JKSimMet
- Tailings dam seepage and stability analysis software – GeoStudio
- Tailings dam geotechnical engineering 3D finite element analysis software – PLAXIS 3D WorkSuite
- Pipeline hydraulic conveying fluid analysis software – FluidFlow

MIM Design Platform







Core Technologies of Mines

After more than seventy years of development, China ENFI has continuously innovated and developed dozens of core expertise technologies in the field of metal and nonmetal mines, which have been practiced and successfully applied in over 400 domestic and international mines in consulting, design, project management, and engineering procurement construction (EPC) projects. Included in the Catalogue of Advanced and Applicable Technologies for the Conservation and Comprehensive Utilization of Mineral Resources (2022 Edition) are technologies such as large-scale efficient mining process technology for deep hard rock ore deposits, key technologies for the integrated treatment of open-pit tailings with full tailings backfilling and safe mining of deep resources, continuous and efficient mining technology for low-grade thick and large ore bodies using the block caving method, efficient crushing and grinding technology for large non-ferrous metal ore semi-autogenous grinding, and center-line embankment method for tailings pond.

Comprehensive technology of deep-buried resources mining
High-density tailings backfill and paste filling
Block caving
Ultra-large capacity mine development
Comprehensive technology of largeopen-pit mining
Open-pit and underground combined mining
Low-grade and refractory deposit mining
Stability monitoring of open-pit slope and TSF
Development of mines with large water inflow
Potash ore mining and processing technology
Efficient comminution process
Polymetallic ore benefication technology
High-efficiency lithium minerals recovery
Efficient separation of rare earth
Long-distance slurry pipeline delivery
Center-line embankment method of tailings pond
Combined waste rock-tailings embankment method
Large-scale tailings dry stacking
Intelligent mine “MIM+” technology
Unmanned track transportation system
Mine solid waste open-pit backfilling treatment

Comprehensive Technology of Deep-buried Resources Mining

China ENFI has anchored its strategic goal of "advancing into the deep earth," undertaking several key research and development programs at the national and ministerial levels, including "Key Technology Research on Safe Mining of Ultra-large Capacity and Ultra-deep Metal Mines." It has relatively established a complete technical system for deep resource development, ultra-large capacity continuous unloading mining of extra-thick and large ore bodies in deep shafts, deep ground stress control, high-load high-speed hoisting in ultra-deep shafts, and high-flow backfilling in deep shafts. Leading the direction of key technology development for deep resource mining in domestic metal mines, it has propelled China's metal mines into the era of ultra-large capacity deep shaft mining.

- Completed the design of the first 1000-meter vertical shaft in China in 1996
- Completed more than 40 ultra-1000-meter vertical shafts domestically and internationally
- Technical output share over 50%
- The max. depth of the vertical shaft exceeding 1900m, with a net diameter reaching 10.5m and a single shaft hoisting speed of 18 m/s
- A single shaft hoisting capacity of 10 million t/a.

Technology Extension and Application:

- Dongguashan Copper Mine
- Huize Lead-Zinc Mine
- Sishanling Iron Ore Mine
- Chengchao Iron Ore Mine
- Sanshandao Gold Mine
- Jinchuan Nickel Mine
- Gold Mine in the Northern Sea Area of Sanshandao,etc.

Block Caving

Block caving is one of the internationally recognized underground large-scale mining methods, being applied by over 50 mines in more than 20 countries. It has the advantages of low unit explosives consumption, high mining intensity and easy-to-realize automation. It is the only underground mining method that can compete with open-pit mining in terms of cost and is the preferred method for mining low-grade thick and large ore bodies. This technology has already achieved significant economic benefits and will play an important demonstrative role in the low-cost, safe, and efficient mining of extra-large lean ore deposits, with the potential to activate over ten billion tons of lean ore resources.

- **The only consulting and design institute in China with a proven track record in Block Caving**
- **Own the software and hardware facilities to deliver the whole life cycle services ranging from Block Caving consultancy and design, technology research and development to operation and maintenance services.**
- **A core technology system and a complete set of technological solutions of modern Block Caving.**

Technology Extension and Application:

- Zhongtiaoshan Tongkuangyu Mine
- Shuangjianzishan Silver Mine
- Changshanhao Gold Mine
- Yechangping Molybdenum Mine
- Pulang Copper Mine, Yunnan
- Panjiatian Iron Ore Mine
- Yanqianshan Iron Ore Mine, etc.

Comprehensive Technology of Large Open-pit Mining

The most direct, fast and conventional method to obtain mineral resources, which can achieve large capacity, low-cost and efficient development of mines.

- **Use advanced optimization theories to determine economically rational mining limits;**
- **Adopt the phased (zoned) and steep slope mining technology to determine a reasonable mining sequence and reduce the stripping work quantity of the initial phase;**
- **Use advanced, high-efficiency and energy-saving equipment to improve the safety and stability of production;**
- **Applicable for non-coal hard rock mines, laterite mine and sand mine, etc.**

Technology Extension and Application:

- Dexing Copper Mine
- Yulong Copper Mine
- Jinduicheng Molybdenum Mine
- Xiarihamu Nickel Mine
- Saindak Copper-Gold Mine
- Ecuador Mirado Copper Mine
- Simandou Iron Ore Mine, Guinea
- Ramu Nickel-Cobalt Mine, Papua New Guinea
- Tagaung Taung Nickel Mine, Myanmar,etc.

High-density Tailings Backfill and Paste Filling

China ENFI has been leading the development direction of filling technology in China, and has played an important role in the progress of green mining technology in China. The "deep cone thickener filling technology" and "new vertical tailings bin technology" independently developed by China ENFI and applied to the mining field are the mainstream processes in China, the developed tailings thickening equipment can thicken low density tailings directly into high concentration or paste tailings, which can effectively improve the filling quality and reduce the filling cost.

› **It possesses a plurality of patents, such as the vertical tailings bin, deep cone thickener, etc., among which its "Mine Filling Equipment" has been granted with the Chinese Patent Award of Excellence, and the relevant technologies have been granted with the National Science and Technology Progress Awards.**

› **ENFI has served more than 50% of mines in China applying filling technology.**

Technology Extension and Application:

- Jinchuan Nickel Mine
- Huize Lead-Zinc Mine
- Huibaoling Iron Ore Mine
- Baixiangshan Iron Ore Mine
- Dongguashan Copper Mine
- Sishanling Iron Ore Mine
- Xi'anshan Iron Ore Mine
- Shuichang Iron Ore Mine
- Chengchao Iron Ore Mine
- Jinshandian Iron Ore Mine
- Shapinggou Molybdenum Mine
- Chalukou Molybdenum Mine, etc.

High-efficiency Comminution and Green Mineral Processing Technology

The efficient comminution technology is one of the technologies to build energy-saving, emission-reduction, intelligent and green process plant, forming a high-efficiency communition technology system with ENFI's characteristics. The green pre-separation technology is to make full use of the separability of coarse-grained ore and gangue, and use the green gangue rejection technology and other technologies to achieve the purpose of green pre-separation of "rejecting gangue as early as possible" for the effect of energy saving, consumption reduction, and quality and efficiency improvement.

- **Advanced modeling software and database for comminution tests, design and production**
- **Semi-autogenous grinding and ball mill grinding process technology, vertical mill communition process and other technologies**
- **New grinding process technology: HPGR mill as the stage-3 (or stage-4) crushing process, pebble crushing ultra-fine crushing equipment**
- **Autonomous analyzable software system: to realize the optimization of green pre-selection technology, parameter optimization, and efficient implementation of expected effects.**

Technology Extension and Application:

- Baixiangshan Iron Ore Mine
- Huibaoling Iron Ore Mine
- Sishanling Iron Ore Mine
- Waitoushan Iron Ore Mine
- Nanfen Iron Ore Mine
- Bong Iron Ore Mine, Liberia
- Mirador Copper Mine
- Dongguashan Copper Mine
- Yulong Copper Mine
- Saindak Copper Mine, Pakistan
- Jinduicheng Molybdenum Mine, etc.

Polymetallic Ore Beneficiation Technology

Based on the design experience of dozens of single metal varieties, China ENFI has formed a technical expert system of "efficient beneficaition of polymetallic and refractory minerals" with complete varieties and integrated research and design, which realizes the overall innovation and progress of theories, technologies and applications, to solve the problems of long process of polymetallic ore beneficiation, difficult separation, and high mutual content of metals in the concentrates.

- **A complete system of scientific research, design, mineral processing reagents and equipment for high-efficiency beneficaiton technologies of complex polymetallic and refractory minerals.**
- **High-efficiency separation technologies for polymetallic ores, such as copper-lead-antimony-zinc-sulfur-gold-silver, copper-molybdenu-tungsten-sulfur,copper-zinc-iron-tin-tungsten-indium, copper-nickel-cobalt-gold, lithium-tantalum-niobium-beryllium, and rare-earth fluorspar barite.**

Technology Extension and Application:

- Xintian Process Plant of Yunnan Hualian Zinc & Indium (6 concentrate products)
- Baiyinchagan Copper-Lead-Tin-Silver-Zinc Polymetallic Mine, Inner Mongolia (9 valuable components)
- Huanggang Iron-Tin Polymetallic Mine, Inner Mongolia (7 concentrate products)
- Asmara Copper-Gold Polymetallic Mine (Mineral processing and metallurgy)
- Zimbabwe Sabi Star Lithium-Ta Polymetallic Mine (With world-leading recovery)
- Xinjiang Dahongliutan Rare-Metal Mine (Li-Be separation technology), etc.

High-efficiency Lithium Minerals Recovery

China ENFI has rich experience in lithium polymetallic ore mineral processing, and continues to rely on the company's core technology and engineering practice in the field of lithium mining to contribute ENFI's expertise to the development of China's new energy industry with high quality.

In 1959, China ENFI designed China's first lithium-beryllium-tantalum-niobium rare polymetallic mine for Xinjiang Keketuohai, adopting the first generation of lithium processing technology-simplified positive flotation process with alkali, achieved comprehensive recovery of lithium-beryllium-tantalum-niobium polymetallic mines, and made important contributions to the China's economy and national defense. The mine therefore was reputed as the “Hero Mine/Meritorious Mine”.

- **Lithium mining technology system: research and development of high-efficiency reagents, communition process, separation process, equipment application, operating conditions, and reduction of mineral processing cost.**
- **Lithium processing technology iteration, accumulation and breakthroughs, leading industry development.**
- **ENFI specializes in the core technology of lithium polymetallic ore beneficiation: the 3rd generation processing technology with gravity flotation combined with flotation and the 4th generation multi-dimensionally regulated processing technology.**

Technology Extension and Application:

- Sabi Star Lithium Mine Porject, Manicaland, Zimbabwe
- Dahongliutan Lithium-Beryllium Polymetallic Mine, Hetian, Xinjiang
- Dechenongba Lithium Mine, Sichuan
- Dangba Lithium Mine, Sichuan
- Murong Lithium Mine, Sichuan
- Polar Lithium Mine, Russia

Efficient Separation of Rare Earth

China ENFI has profound history and sharp modern innovation in the mineral processing engineering design of rare-earth mines, and continues to rely on the company's core technology and engineering practice in the whole industry chain of mining, processing and metallurgy in the field of rare earth to contribute ENFI's power to China's rare earth development strategy.

- **Technologies of the whole process and an integrated system for mining, mineral processing and metallurgy.**
- **Core technology of ENFI's characteristic rare-earth ore mineral processing: optimized SAG short-flow process and magnetic-heavy flotation combined mineral processing technology.**
- **ENFI maintains a leading position in the core technology of enrichment and separation in rare earth mineral processing.**

Technology Extension and Application:

- China's first rare earth processing and metallurgical production plant-Inner Mongolia Baotou Iron and Steel Company (the world's largest rare earth mine: Bayan Obo Rare-Earth Mine)
- Efficient, environmentally-friendly, safe and green model of a single rare earth mine-Maoniuping Rare-Earth Mine, Mianning County, Sichuan

Long-distance Slurry Pipeline Delivery

As a pioneer in slurry pipeline delivery technology, China ENFI has a number of technical expertises, such as high-concentration slurry transportation, high-drop pipeline orifice plant energy dissipation, multi-level series transportation of high-flow centrifugal pumps in a single-pump station, high-pressure diaphragm pump multi-level paralleled transportation, and pipeline delivery in alpine and high-altitude areas, etc. Such technologies not only have solved many technical bottlenecks, but also formed ENFI's industry-leading core technology of long-distance slurry pipeline delivery, which made important contribution to the safe and green development of the industry and promoted the leapfrog development of China's slurry pipeline delivery technology.

- **57 pipeline transportation tests;**
- **Proposed 11 hydraulic formulas for solid-liquid two-phase flow;**
- **Acquired 3 software copyrights;**
- **Chief editor and co-editor of about 30 standard specifications, design manuals and books;**
- **3 First Prizes for Scientific and Technological Progress;**
- **More than 20 provincial and ministerial awards;**
- **17 patents, including 6 invention patents.**

Technology Extension and Application:

- Ramu Nickel-Cobalt Mine, Papua New Guinea
- Xinjiang Huoshaoyun Lead-Zinc Mine
- PT. Huayue Nickel-Cobalt Mine
- Sorowako Nickel-Cobalt Mine, Indonesia
- Chenxi Nickel-Cobalt Mine, Indonesia
- Blue Flame Nickel-Cobalt Mine, Indonesia
- Zhongtiaoshan Copper Mine, Shanxi
- Panjiatian Iron Ore Mine, Sichuan, etc.

Center-line Embankment Method for Tailings Pond

The center-line embankment method for tailings pond innovated and developed by China ENFI is intrinsically safe and promotes the development of mine safety and environmental protection technologies. The technology is not restricted by factors such as geography, production capacity, environment, resources and energy, with relatively low capital and operation cost but relatively large storage capacity. It solves the problem of high-stacking dams of tailings ponds in China, fundamentally improves the overall safety of domestic TSFs, and fills in the gaps of the long-standing lack of systematic research in this field in China.

- **3 prizes for Scientific and Technological Progress (including a First Prize);**
- **6 First Prizes at the provincial and ministerial levels;**
- **15 patents, including 6 invention patents (including 3 patents for foreign inventions).**

Technology Extension and Application:

- No.4 TSF of Dexing Copper Mine
- No.5 TSF of Dexing Copper Mine
- Yulangpei TSF of Pulang Copper Mine

Combined Waste Rock-Tailings Damming

China ENFI has successfully developed the waste rock-tailings mixed damming technology through the research of key technologies, such as zoned crushing index control of waste rock dam body, key technology of waste rock dam body anti-filtration, and balance between dam body and tailings beach, which can be widely applied in the field of bulk solid waste disposal of metal and non-metal mines, realizing the integrated planning and construction of TSF and waste dump. It can improve the utilization rate of land, facilitate environmental protection, and play an important role for the advancement of green mining technology in China.

- **Included in the State Mine Safety Supervision Bureau's Catalogue for the Promotion of Advanced and Applicable Technologies and Equipment for Mine Safety (2024);**
- **2 prizes for Scientific and Technological Progress (including a First Prize);**
- **5 awards of provincial and ministerial level;**
- **3 patents, including 1 invention patent.**

Technology Extension and Application:

- Daemi TSF of Mirador Copper Mine, Ecuador
- Tongjiedagou TSF of Yunnan Hualian Zinc & Indium
- Nanjia TSF of Yunnan Hualian Zinc & Indium, etc.

Unmanned Track Transportation System

Since it initiated the comprehensive research and development on automated mining technology of unmanned electric locomotives in 2011, China ENFI has become the only company in China that has mastered the technology of double-locomotive traction, double-locomotive linkage and load balancing of unmanned electric locomotives.

Unmanned rail transportation system is China ENFI's proprietary product, the first application of which in Asia was realized in 2012. The system is based on the automated operation of ENFI's unmanned electric locomotive system and integrated control of the entire transportation section, which addresses the safety hazards in the mine production and transportation section and reduces the on-site operators for the mine rail transportation section by 75%, resulting in great improvement of transportation efficiency and the informatization level of the mine transportation process.

Technology Extension and Application:

- Dongguashan Copper Mine, Tongling Non-Ferrous Metals Group
- Yunnan Gold Mining Group Hongniu Copper Mine
- Chambishi Main West Orebody, Zambia
- Dexing Copper Mine
- Yanqianshan Iron Ore Mine

- **Unmanned driving remote control system**
- **Electric locomotive control system**
- **Double locomotive traction head-to-tail communication system**
- **Automatic transportation system**
- **Network communication system**
- **Remote control system for ore loading**
- **Switch-machine control system**
- **Level monitoring system**
- **Obstacle detection system**
- **Video surveillance system**
- **Automatic measurement system**
- **Accurate positioning system of electric locomotives**

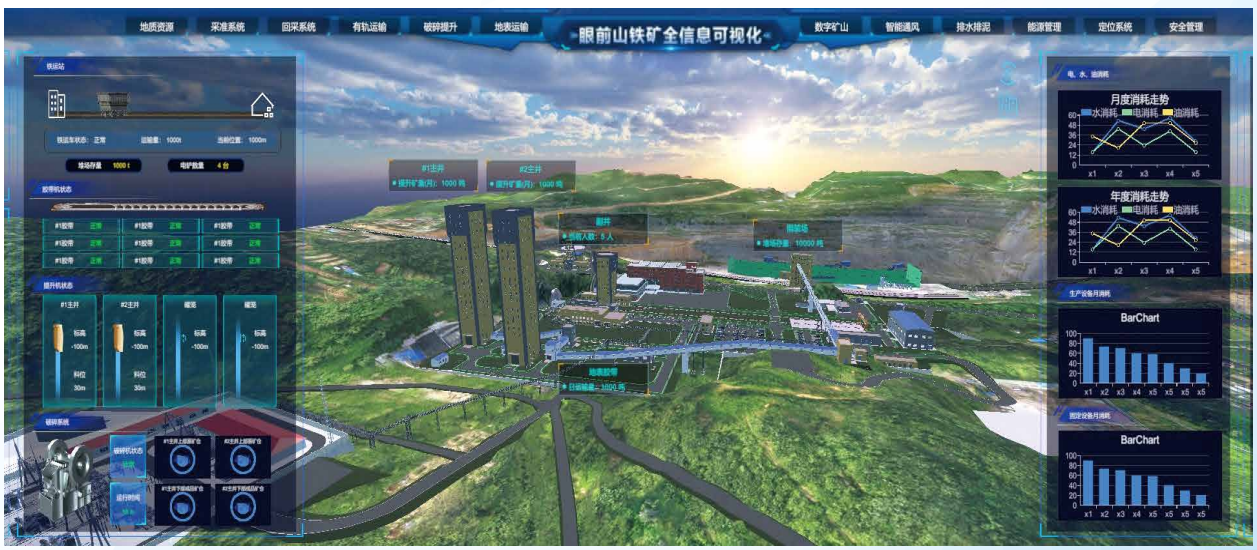
Intelligent Mine “MIM+” Technology

As a leader in intelligent mining in China and a provider of intelligent manufacturing system solutions for the Ministry of Industry and Information Technology, China ENFI has built a multi-disciplinary integrated intelligent mining technology team to carry out special research and development. ENFI jointly established Beijing Engineering Research Center of China Mining Innovation together with National Supercomputing Tianjin Center, tackled key issues, and launched the "MIM+" digital integrated solutions, realizing the "one-stop" technical service system of the whole life cycle from the overall project planning, scheme design, construction, production, operation and maintenance to the mine closure. China ENFI has fully mastered the "intelligent+mining" technology in automated mining, unmanned rail transportation, automatic hoist control, automatic filling control, intelligent power supply and distribution, on-demand ventilation, unmanned fixed facilities, automated mineral processing, intelligent grinding expert system, intelligent flotation expert system, on-line TSF monitoring, multi-source heterogeneous data collection, virtual mine construction, etc., and has successfully promoted and applied such technology in multiple mines, realizing achievement transformation.

- **Integrating various technologies and models such as engineering simulation, data acquisition, big data analysis, artificial intelligence, etc., achieving the digital presentation of all deliverables;**
- **Dynamically express the full life-cycle changes of engineering design, construction, and operation to achieve digital empowerment of project management in the mining field.**

Technology Extension and Application:

- Yanqianshan Iron Ore Mine
- Fengshan Copper Mine
- Chambishi Copper Mine
- Hongniu Copper Mine
- Dexing Copper Mine,etc.



Typical Projects

Innovation led Mining Projects

The mine applying downward consolidated filling with the largest continuous stoping area in the world --
Jinchuan Nickel Mine

China's ultra-large open-pit metal mine -- **Dexing Copper Mine**

The underground copper mine with the largest production capacity in China --
Pulang Copper Mine

China's first mine with 1000m deep shaft -- **Dongguashan Copper Mine**

China's first mine employing block caving -- **Tongkuangyu Copper Mine**

China's first metal mine applying undersea mining -- **Sanshandao Gold Mine**

China's first zero-waste mine -- **Qixiashan Lead-Zinc Mine, Nanjing**

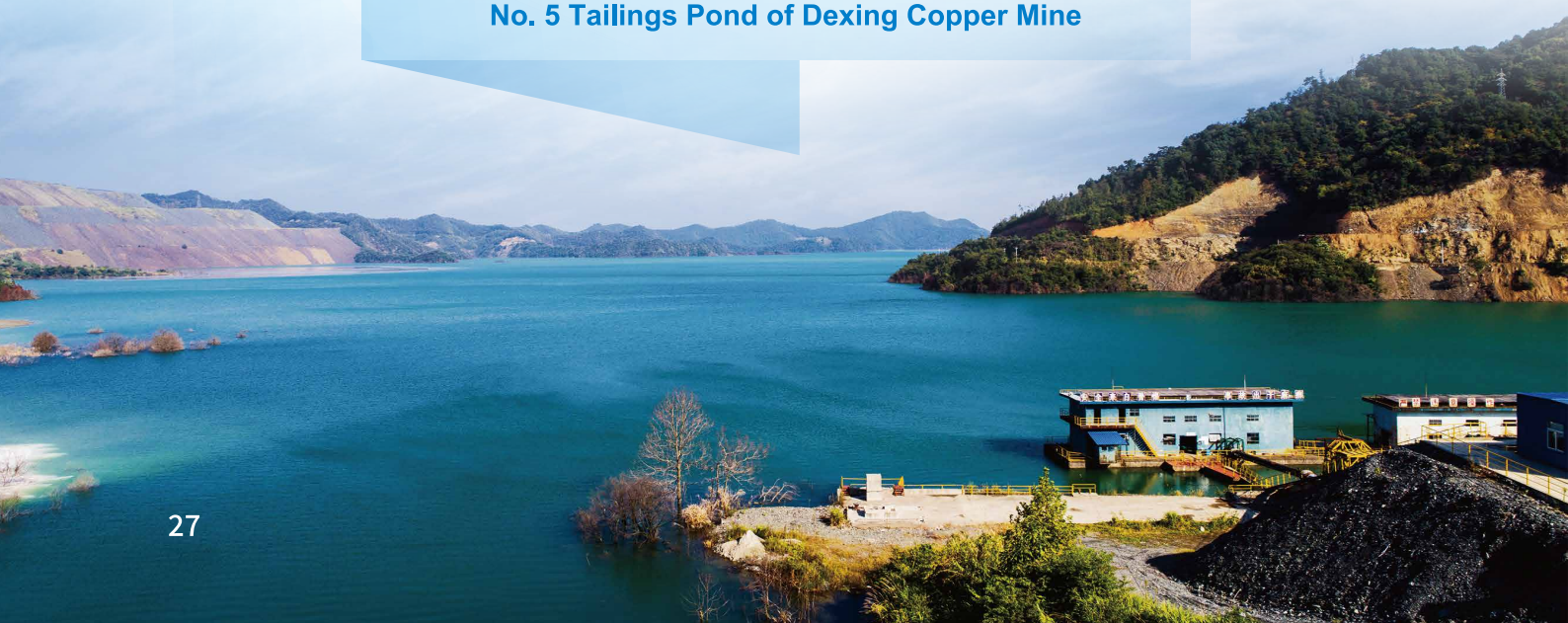
China's first mine employing efficient large-diameter long-hole mining process --
Anqing Copper Mine

China's first large iron ore mine with shaft over 1000m deep -- **Chengchao Iron Ore Mine**

China’s first mineral processing plant employing SAG process --
Dongguashan Copper Mine

First mineral processing plant in China’s non-ferrous industry applying HPGR --
Jinduicheng Molybdenum Mine

The largest tailings pond in Asia --
No. 5 Tailings Pond of Dexing Copper Mine



Mining, Mineral Processing and Tailings Complex of Open-pit Mine

Yulong Copper Mine--

High-altitude open-pit mine

The open-pit mining capacity: 19.89mt/a/66.3kt/d;
Mining area elevation from 4,560m to 5,124m;
The main mineral processing plant building elevation at 4,629m.

Dexing Copper Mine--

China's ultra-large open-pit metal mine

Mining and mineral processing capacity: 135kt/d
Largest TSF in Asia with a storage capacity of 1.031bm^3 and a dam height of 222m

Jinduicheng Molybdenum Mine--

Molybdenum mine model in green, energy saving and comprehensive utilization

Molybdenum ore mining capacity 1st in Asia and 3rd in the world,
First process plant applying HPGR process in non-ferrous metal industry

Ramu Nickel-Cobalt Mine, Papua New Guinea--

Leading Ni laterite technology

World-level nickel laterite project, with production capacity of 5.7mt/a
An EP project undertaken by ENFI

Saindak Copper-Gold Mine, Pakistan--
China-Pakistan economic cooperation model
Original capacity: 4.25mt/a;
Capacity after expansion: 7mt/a;
Demonstration project of "China Pakistan Economic Corridor" and "the Belt and Road" construction demonstration project

Mirador Copper Mine--
First large open-pit solid minerals development project in Ecuador
Phase 1 production capacity: 20mt/a;
Phase 2 expanded capacity: 46.2mt/a;
Invested, designed, constructed, manufactured, operated and served by China.

Mining, Mineral Processing and Tailings Complex of Underground Mine

Tongkuangyu Copper Mine--
China's first large-scale block caving mining operation
Design capacity: 9mt/a;
Long distance belt ore lifting system, with single section belt length of 3,200m.

Dongguashan Copper Mine--
China's first 1000m-deep shaft mining
First process plant using comminution process of SAG mill + ball mill in China;
First in China to use total tailings high density consolidated filling system.

Pulang Copper Mine--

The underground copper mine with the largest production capacity in China

The first underground metal mine in China with production capacity over 10mt--production capacity of 12.5mt/a;
Block caving, with max.height nearly 400m for single level.

Sanshandao Gold Mine--

China's first undersea mining metal mine

China's first undersea mining metal mine;
Production capacity of 8,000t/d;
The first deep shaft in Asia with a depth of 1,915m and a net diameter of 10.5m.

Jinchuan Nickel Mine--

Downward consolidated filling mine with the largest continuous stoping area in the world

The largest nickel mine and Ni-Co production base in China;
High-stress super-large refractory metal deposit rarely found both in China and abroad.

Sishanling Iron Ore Mine--

Super-large iron ore mine with completed deep shaft and a capacity of over 10mt/a

Largest measured and registered monomeric iron ore mine in China with a designed capacity of 15mt/a and a prospect capacity of 30mt/a.

Laos Dongtai Potash Mine--

Project awarded with Luban Prize and EPC Contracting Bronze Key Prize

The first overseas potash project constructed by China;
The first potash open-pit project.

Masteel (Group) Baixiangshan Iron Ore Mine--

Large-Inflow & Tailings-Free Mine

Complex hydrogeological conditions with the max. water inflow as high as 30,000m^3/d;
Full tailings high density filling;
No independent TSF built.

Underground Mine Projects

Kaiyang Phosphate Mine--
Phosphate mine with largest production capacity and deepest mining depth in China
Designed capacity of 12mt/a and the largest mining depth exceeding 1500m.

Mineral Processing Projects

BOGUTY Tungsten Mine, Kazakhstan--
World's monomer tungsten mine with the largest production capacity
Initial production capacity of 3.3mt/a, making it the largest tungsten mine in Kazakhstan.

Mineral Processing Plant for Jinchuan Group
Three grinding and processing systems, Stage 1 with a capacity of 14,000t/d, Stage 2 of 11,000t/d and 4,500t/d, Stage 3 of 6,000t/d;
Two concentrate thickening and filtration systems.

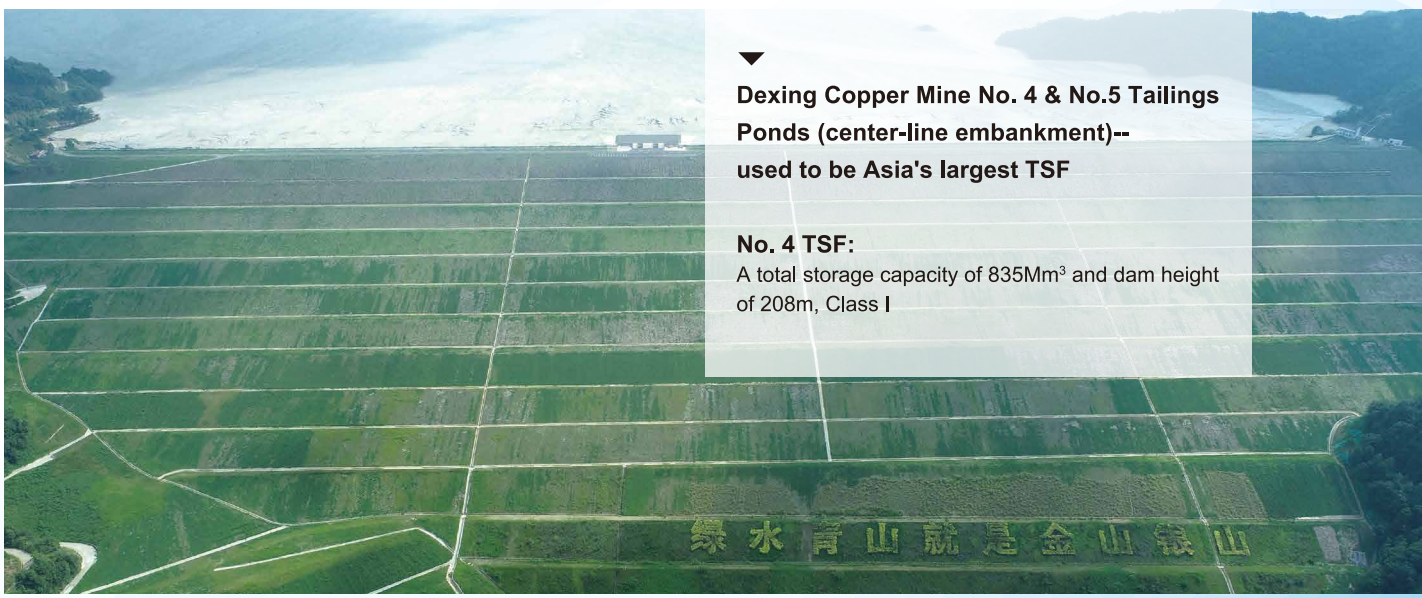
Xintian Mineral Processing Plant of Dulong Copper-Zinc-Tin Mine--
Project granted with National Quality Engineering Award
The Zn-Sn-Cu polymetallic process plant with the largest single train daily throughput in the world of 2.97mt/a;
The first SAG mill + Ball mill milling system applying the Grinding Expert System.

Long-distance Slurry Pipeline Delivery Projects

Long-distance Ni-Co slurry pipeline delivery (EP) for Ramu project, PNG--
First long-distance nickel laterite slurry delivery pipeline put into operation in the world
Transporting capacity of Ni-Co RoM: 3.21mt/a;
Pipeline length:135km;
4-stage high flow centrifugal pump for close range series transportation.

Huayue Ni-Co slurry pipeline project--
First long-distance nickel laterite slurry pipeline delivery line in Indonesia
Transporting capacity of Ni-Co RoM: 5.2mt/a;
Pipeline length: 61km;
Pressure:10Mpa;
6 sets of diaphragm pumps for paralleled transportation.

TSF Projects



Dexing Copper Mine No. 4 & No.5 Tailings Ponds (center-line embankment)--
used to be Asia's largest TSF

No. 4 TSF:
A total storage capacity of 835Mm^3 and dam height of 208m, Class I

No. 5 TSF:
A total storage capacity of 1.031bm^3 and dam height of 222m

Beigou TSF and Quanshuigou TSF of Donggou Molybdeum Mine

Beigou TSF:
A total storage capacity of 124Mm^3 and dam height of 195m

Quanshuigou TSF:
A total storage capacity of 78.6Mm^3 and dam height of 215m

Intelligent Mine Projects

Chambish Copper Mine, Zambia--
Africa's first digitalized mine

Production capacity of the main west orebody: 1.5mt/a;
Production capacity of the southeast orebody: 3.3mt/a;
Integrated control design and application of whole new underground digitalized and automatic mining

Smart Mine for Yanqianshan iron ore mine (EPC)--
Whole system smart mine

Production capacity: 8mt/a;
The first industrial Internet architecture intelligent mine in China's iron ore field;
Demonstration intelligent mine of whole-system top-level planning, design, construction and operation.

5G+Intelligent System for Rail Transportation System in Mining Area of Dexing Copper Mine--
The largest intelligent system built in China

Ore transportation capacity: 40kt/d;
The largest transportation capacity and plant capacity in China: 14 sets of trains, each pulling 18 trams (10m^3).

Unmanned Driving Project for Hongniu Copper Mine of Yunnan Gold & Mining Group--
High-altitude dual-engine traction unmanned driving mode

An altitude of approximately 4,100m; production capacity of 4,000t/d.

Green Mine Projects

Mine Solid Waste Open-pit Backfilling Treatment

Daye Non-ferrous Company Tonglvshan Copper-Iron Mine--Open-pit filling technology model

Throughput of open pit of 291km^3/a;
The treated open-pit volume estimated totaling 8,032km^3 in 28 years.
The first mine in China shifted from open-pit mining to underground mining that in China that successfully applies open pit total tailings consolidated filling technology to ensure the safety underground mining.

EPC/EPCM Projects

18Mt/a Process Plant (EPC) of Yulong Copper Mine

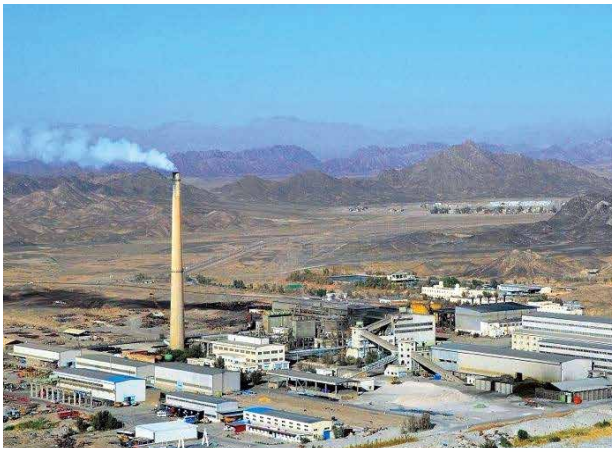
Ore throughput: 60kt/d (18mt/a);
A world-class and ultra large mineral processing plant;
Successfully completed and put into operation within 20 months;
Altitude of 4660m, in high altitude, low air pressure, oxygen deficiency, high and cold area

Nanfen Process Plant (EPC)--
Process plant upsizing and intelligent modification model

Key project of Ansteel;
Throughput: 10mt/a;
Completed and put into production in 12 months.

Yunshan Graphite Mine (EPC)--
World largest single graphite processing production line

Production capacity: 2.25mt/a;
Applying the combined column-cell process and staged grinding and separation process in roughing stage in the graphite industry.



Saindak 275 Processing Plant (EP)
The old system capacity: 4.25mt/a;
The new system capacity: 2.75mt/a;
A demonstration project of China-Pakistan Economic Corridor and Belt and Road construction.

Kamoa-Kakula Copper Mine (EPCM), DRC--
World level high-grade copper mine
Expected to become the 3rd largest copper mine in the world and the largest in Africa;
Total capacity to be increased to 14.2mt/a;
Full 3D digital delivery of design.

MAK Tsagaan Suvarga Cu-Mo Project, Mongolia--
3rd largest Cu-Mo reserves in Mongolia (process plant EPCM+TSF EPS)
Ore throughput: 14.6mt/a;
Annual output: 300kt copper concentrate & 5,000t molybdenum concentrate.

Ghana Namdini Gold Mine (EPCM)--
Super-large refractory gold mine
Production capacity: 9.5mt/a;
Belt and Road "Going Global" Key Project

Asmara Copper-Gold Polymetallic Project, Eritrea (EPC)
China ENFI's first EPC project in Africa, integrating mining preproduction, process plant, TSF and etc.;
A 1mt/a mining and processing capacity heap leaching plant and a 4mt/a Cu-Zn process plant to be built.

Mine Project Reference

Reference List for Part of General Contracting Projects in China (2023-2014)

Year	Project name	Type of mine	Production capacity	Client
2023	CNMC Hongtoushan Digital Mine Construction (Digital intelligence engineering) EPC Project	Intelligent Mine	/	CNMC Fushun Hongtoushan Mining Co., Ltd.
2022	Yanqianshan Iron Ore Mine - Underground Safe and Efficient Smart Mine Construction EPC Project	Underground	8 Mt/a	Yanqianshan Branch, Ansteel
2022	Xilingol League Longxing Mining Filling System EPC	Underground	200m^3/h	Xilingol League Longxing Mining Co., Ltd.
2022	Fengshan Copper Mine New Filling Station General Contracting	Underground	2000t/d	Daye Nonferrous Metals Co., Ltd.
2022	15Mt/a Mining Project Phase 1 of Sishanling Iron Ore Mine,	Underground	15Mt/a	Benxi Longxin Mining Co., Ltd.
2022	Mineral Processing Efficiency Improvement and Intelligent Modification of Nanfen Green Mine	Underground	10Mt/a	Nanfen Mineral processing Plant, Bensteel Group Corporation Limited
2022	Construction of Yelonggou Spodumene Ore Filling System	Filling	405Kt/a	Aoyinuo Mining Co., Ltd, Jinchuan Group
2022	Fengshan Copper Mine Digital Construction (Phase 1) (Phase 1 Digital Intelligence Project) EPC Contracting	Underground	2000t/d	Daye Nonferrous Metals Metals Group Holdings Co., Ltd.
2021	Dayingezhuang Tailings Facilities Project	Underground	6000t/d	Zhaojin Mining Industry Co., Ltd.
2021	Process Plant EPC Project of Yunshan Graphite Mine in Luobei County	Open-pit mining	2.25Mt/a	Luobei Yunshan Graphite New Material Co., Ltd.

2020	Deep Mining Expansion and Technical Modification of Yinshan Mine Industry Co.,Ltd.Modification & Pb-Zn Process Plant Relocation Integration EPC Contracting	Open-pit mining	4.29 Mt/a	Jiangxi Copper Corp. Yinshan Mining Industry Co., Ltd.
2019	Unmanned Track Transportation System of the Mining and Mineral Processing Project of Hongniu Copper Mine	Underground	1.23 Mt/a	Hongniu Mining Co., Ltd., Shangri-La City, Yunnan Province
2018	Construction, Installation and Equipment Supply for 18Mt/a Beneficiation Plant of Yulong Copper Mine Upgrade and Expansion Project in Tibet	Open-pit mining	18 Mt/a	Tibet Yulong Copper Industry Co., Ltd.
2016	Design, Procurement and Construction of Adit Inlet Air Preheating and Return Air Waste Heat Recovery and Utilization of Pulang Copper Mine Phase-I Mining and Mineral Processing Project	Underground	12.5 Mt/a	Yunnan Diqing Nonferrous Metals Co., Ltd.
2014	Gujiatai Iron-ore Mine Remote Control and Automated Mining System Integration and Equipment Supply General Contracting Project	Underground	2 Mt/a	Laiwu Mining Co., Ltd. of Laiwu Steel Corporation

Reference of Part of International Projects (2023-2012)

Year	Project name	Type of mine	Production capacity	Client
2023	Tsagaan Suvarga Cu-Mo Mine EPCM Project, Mongolia	Underground	14.6 Mt/a	ErdenesTsagaanSuvargaLLC
2023	Ghana Gold Mine EPCM Project	Open-pit mining	9.5 Mt/a	Cardinal Namdini
2023	Project Management Service of Kamoa Copper Mine Phase 3	Underground	5 Mt/a	Mining Limited
2022	Expansion Project of Saindak Copper-Gold Mine, Pakistan	Open-pit mining	2.75 Mt/a	Kamoa Copper SA

2022	Supply of Grinding and Classification Optimal Control Expert System for Pumpi Copper and Cobalt Mine Project in DRC	Open-pit mining	2.6 Mt/a	DRC Lamikal Group Corporation of Wanbao Mining
2022	Asmara Cu-Au Polymetallic EPCM Project, Eritrea	Open-pit+ Underground mining	4 Mt/a	Sichuan Road & Bridge (Group) Corporation
2022/ 2021	Gyratory Crusher Area Modification and Equipment Supply of HUSAB project in Namibia	Open-pit mining	5 Mt/a	SWAKOPURANIUM(PTY)LTD
2020	Project Management Service of Kamoa Copper Mine Phase 2	Underground	3.8 Mt/a	Kamoa Copper SA
2020	Chambishi Main & West Orebody Automation and Power Control Modification Project	Underground	1.6 Mt/a	NFC Africa Mining PLC
2020	Musonoi Project of Metorex Ruashi Mining SAS	Underground	1.5 Mt/a	Jinchuan Group
2017	Chambishi Main & West Orebody 500m-Level Unmanned Electric Locomotive Transportation Project	Underground	1.6 Mt/a	NFC Africa Mining PLC
2019/ 2016	Information Technology Integration of Chambishi Southeast Orebody Project	Underground	3.3 Mt/a	NFC Africa Mining PLC
2016	Chambishi Main & West Orebody Power Contral Modification Project	Underground	1.6 Mt/a	NFC Africa Mining PLC
2016	Kinsenda Filling System	Underground	600 Kt/a	CHINAENFIDRC CORPORATIONSARL
2014	PNG Ramu Nickel Laterite Project	Open-pit mining	5.7 Mt/a	China Metallurgical Group Corporation
2012	SINCOMINES Cu-Co Project, DRC	Open-pit mining	9 Mt/a	SINCOMINES

Mine Project Reference

Reference of Part of Consulting/Design Projects in China (2023-2021)

Year	Project name	Type of mine	Ore type	Production capacity	Client
2023	Process Plants I and II Process Technology Upgrade and Transfor mation Project of Yulong Copper Mine	Mineral processing	Copper ore	18 Mt/a	Tibet Yulong Copper Industry Co., Ltd.
2023	Deep Mining Design of Tongkuangyu Copper Mine	Underground mining	Copper ore	9 Mt/a	Shanxi Northern Copper Co., Ltd.
2023	Huoshaoyun Pb-Zn Open-pit Mining Project in Hetian County, Xinjiang Province	Open-pit mining	Lead-zinc ore	2.5 Mt/a	Huoshaoyun Lead-Zinc Mine Co., Ltd.
2023	Mining and Mineral Processing of Daban Fluorite Mine in Xinjiang	Open-pit mining/mineral processing/tailings	Fluorite	1.2 Mt/a	Xinjiang Anbo Ruikang Energy Co., Ltd.
2023	Design of Dechenongba Lithium Mine in Yajiang, Sichuan	Open-pit mining/mineral processing/tailings	Lithium ore	1.5 Mt/a	CATL-Sichuan
2023	Deep Phosphate Mining in East Wing of Kaiyang Yangshui Mining Area	Underground mining	Phosphate ore	12 Mt/a	Guizhou Kailin (Group) Co.,Ltd.
2023	Mining and Mineral Processing of Dahongliutan Rare Metal Mine in Xinjiang	Open-pit mining+ mineral processing	Rare metal ore	3 Mt/a	Xinjiang Kunlun Blue Diamond Mining Development Co.
2022	Dagushan Iron Ore Mine Open Pit to Underground Mining	Open-pit to underground mining	Iron ore	6 Mt/a	Dagushan Branch, Ansteel
2022	CATL Yichun Li Resource Mining and Tailings Project	Open-pit mining	Lithium ore	33Mt/a	CATL-Yichun
2022	Comprehensive Utilization of Lean Mineral Resource at No.2 Mining Area	Underground mining	Nickel ore	2Kt/d	Jinchuan Group Co., Ltd.
2022/ 2018	Upgrading and Modification Project of Jinduicheng Molybdenum Mine Mineral Processing	Mineral processing	Molybde num ore	30Kt/d	Jinduicheng Molybdenum Co., Ltd. Mine Branch
2022	Dangba Mine Area Li Ore Mining & Processing Complex, Maerkang	Underground mining/mineral processing	Lithium ore	5 Mt/a	Maerkang Jinxin Mining Co., Ltd.
2022	Overall Design of Fushan Mine Area	Mining	Gold ore	1.6Kt/d	Zhaoyuan Fushan Gold Mine Engineer ing Co., Ltd.
2022	Gaoliangding Building Granite Mine in Guangdong	Mining	Granite ore	2.2 M m^3/a	Jiangmen Hefeng Stone Industry Co., Ltd.

2022	Yinkeng Mine Area Sandstone Ore (for Building Use) Mining in Guangdong	Open-pit mining	Sandstone ore	22 Mt/a	Qingyuan Yuesheng Green Building Materials Investment Co., Ltd.
2023	5Ktd Open-pit to Underground Mining Project	Open-pit to underground mining	Copper ore	5Kt/d	Jiangxi Copper Corp. Yinshan Mining Industry Co., Ltd.
2022	Mining and Mineral Processing of Xinjiang Ruoqiang Karchar Fluorite Mine	Underground mining/mineral processing/tailings	Fluorite	1.2 Mt/a	Xinjiang Hua 'ou Mining Co., Ltd.
2021	Yanqianshan Iron Ore Mine West Orebody Mining by Block Caving	Underground mining	Iron ore	4 Mt/a	Yanqianshan Branch, Ansteel
2021	Tongkuangyu Yuanzigou TSF Design	Tailings	Copper ore	9 Mt/a	Northern Copper Industry Co. Ltd.
2021	Qinggou TSF Design	Tailings	Iron ore	8 Mt/a	Sichuan Anning Iron and Titanium Co., Ltd.z
2021	Mineral Resource Development of Murong Lithium Mine in Sichuan	Underground mining/mineral processing/tailings	Lithium ore	3 Mt/a	Yajiang Huirong Mining Co., Ltd.
2021	Ansteel Yanghugou TSF	Tailings	Iron ore	24 Mt/a	Ansteel Group Mining Corporation Limited
2021	Mining and Mineral Processing Design of Songjiagou Molybdenum Mine	Underground mining/mineral processing	Molybdenum ore	6.6 Mt/a	Xi'an Xincheng Investment Co., Ltd.
2021	6Kt/d Mining and Mineral Processing of Zhugongtang Pb-Zn Mine	Mining/mineral processing	Lead-zinc ore	1.98 Mt/a	Guizhou Dingshengxin Mining Development Co., Ltd.

Reference of Part of International Consulting/Design Projects (2023-2016)

Year	Project name	Type of mine	Type of project	Production capacity	Client
2023	Pomalaa Tailings Dry Stacking Project in Indonesia	Tailings	Design	16 Mt/a	PT.KOLAKANICKEL INDONESIA
2023	Kola Potash Project of Kore Potash in the Republic of Congo	Underground mining/mineral processing/tailings	Design	7.2Mt/a	SEPCO Electric Power Construction Corporation
2022	Mining and Mineral Processing (Expansion) Project of Mirador Copper Mine in Ecuador	Mineral processing	Design	46.2 Mt/a	ECUACORRIENTES.A

2022/ 2016	Daemi TSF of Mirador Copper Mine Project in Ecuador	Tailings	Technical service	Total storage capacity of 435 million m³	ECUACORRIEN-TES.A
2022	MMG-KEP Process Plant Expansion Project	Mineral processing	Design	2.3 Mt/a	MCC International Incorporation Ltd.
2022	Basic Design of Kamoa Kakula Copper Mine Phase 3	Mineral processing	Design	14.2 Mt/a	Kamoa Copper SA
2021/ 2019	Mining and Mineral Processing of Boguty Tungten Mine in Kazakhstan	Mineral processing	Design	3.3 Mt/a	Jettsu Tungsten Industry Co., Ltd.
2021	Twangiza Gold Project in Democratic Republic of the Congo (DRC)	Open-pit mining	Design	3.3 Mt/a	RFW Banro Investments Co., Ltd.
2021	Mining, Mineral Processing and Tailings Project of Sabi Li-Ta Polymetallic Mine in Manicaland, Zimbabwe	Open-pit mining/mineral processing/tailings	Design	990 Kt/a	Max Mind Investment Limited
2020	PT. Huayue Nickel-Cobalt Slurry Long-distance Pipeline Conveyance	Tailings	Consulting	5.2 Mt/a	PT. Huayue Ni&Co Co., Ltd.
2020	Musonoi Copper Mine in DRC	Underground mining	Design/ consulting	1.2 Mt/a	China ENFI DRC Corporation SARL
2018	Cyclone Zircon Project in Australia	Underground mining	Consulting	10 Mt/a	Diatreme Resources Ltd
2018	Chambishi Copper Mine West Orebody Deep Mining	Underground mining	Design/ consulting	1.6 Mt/a	NFC Africa Mining PLC
2018	5004C Zirconium Titanium Placer Project in Zambezia Province, Mozambique	Underground mining	Consulting	19.8 Mt/a	Hong Kong Great Wall Co., Ltd.
2018	WadiGabgaba Gold Mine in Sudan	Open-pit mining	Consulting	3.7 Mt/a	Wanbao Mining
2017	J Resources Gold Mine in Indonesia	Open-pit mining	Consulting	6.6 Mt/a	PTJ Resources
2017	Michiquillay Copper Mine in Peru	Open-pit mining	Consulting	3.3 Mt/a	China Minmetals Corporation
2017	Gamsberg Zinc Concentrator Project in South Africa	Mineral processing	Design	4 Mt/a	ELB Engineering Services(Pty)Ltd
2016	Bahuerachi Copper Polymetallic Mine in Mexico	Open-pit mining	BFS	20 Mt/a	Jinchuan Group

CHINA ENFI ENGINEERING CO.,LTD.
CHINA ENFI ENGINEERING CORPORATION

Tel: +86-10 63936881 +86-10 63936672 +86-10 63936282
Add: No.12 Fuxing Avenue, Beijing, China.100038
Web: www.enfi.com.cn