

Second Batch of Domestic TOP TENs List

China Industrial BAT List

BAT1: The High-effective Energy-conservation Recovery Technology of the Excavator's Potential Energy

1. Technical principle

The high-effective energy-conservation recovery technology of the excavator's potential energy is to use the inert gas energy storage system,utilize the potential energy that is generated when the excavator working device (boom) falling,compress the inert gas in the energy storage tank to recover the potential energy through driving the hydraulic oil in the energy

storage cylinder. Inversely,when the working device (boom) lifting,through the optimization technology of hydraulic valve and main pump ratio,the energy storage tank and the power cylinder tank work together to drive the working equipment realize the digging operation,improves the working speed and digging output of the excavator working device,so as to reduce the engine power in design,reduce the excavator excavation fuel consumption,and improve the overall

working efficiency of the excavator.

2.Main technical specifications

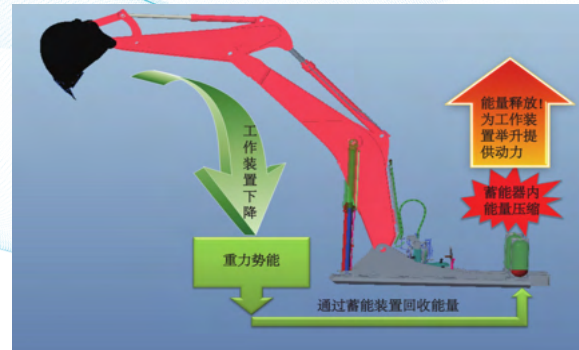
The energy storage system mainly includes an accumulator,an energy storage cylinder,and a control valve. The accumulator is filled with inert gas,which designed maximum pressure is 65MPa and working pressure is 25MPa.

3.Energy conservation effects

Compared with traditional excavators,the fuel consumption per unit excavation is reduced by 30%~50% by using this technology,and the output is increased by 50%~100% compared with the traditional excavator of same installed power.

4.Application areas

Applicable to all kinds of equipment that use oil cylinders to control lifting,such as excavators,loaders,and other construction machinery etc.,Applied to mining excavation,infrastructure,water conservancy projects,rescue and disaster relief and other emergency materials excavation and transfer,port hoisting,and military facilities Emergency launcher.



5.Technology Application Case

A company with an annual output of 30 million tons of coal,uses 5 energy-conservation and high-efficiency excavators with potential energy recovery technology to replace the traditional excavators of the same power. Compared with the same bucket capacity excavators in the industry,the annual energy saving is about 222.7 tons of standard coal,and the annual energy saving benefits is about 4.5 million RMB. ■



BAT2: Energy Saving Technology Based on Three-phase Sampling and Fast Response

1. Technical principle

According to the energy conservation principle of motor voltage reduction, based on three-phase sampling and fast response motor energy conservation technology, adopts the closed-loop feedback system to adjust the voltage, accurately control the voltage and current of the motor to keep the motor working in the best efficiency state. Adopts core technologies, such as adjustable resistance network three-phase sampling, high frequency pulse train trigger SCR (Silicon Controlled Rectifier), induced voltage detection, effectively improve the detection accuracy and response speed of the power factor angle detection circuit, and ensure that the SCR can be more stable, accurate and fast triggered, ensures the motor start and running more smoothly, to reduce energy consumption of the motor.

2. Main technical specifications

Using high-frequency pulse train trigger SCR

technology, the pulse width is 18 microseconds, the interval is 40 microseconds, and the number of pulses exceeds 100, applicable for low-voltage 3-phase AC asynchronous motors with power from 7.5kW to 315kW.

3. Energy conservation effects

Impact load conditions: On mechanic equipment with large motor load variation, the active power saving rate is 20%~45%. Gradual load conditions: On mechanic equipment with less motor load variation, the active power saving rate is 15%~30%. Constant medium and high load conditions: On mechanic equipment with stable motor loads, the active power saving rate is 5%~7%.

4. Application areas

It can be widely used in metallurgy, petrochemical, coal, manufacturing, and other industries involving low-voltage three-phase AC asynchronous motors.

5. Technology Application Case

Case I

Aiming at the actual working condition of a group company's stamping workshop where the original motor load with a large variation, uses the energy-saving technology based on three-phase sampling and fast response to transform 30 sets of 2.2kW stamping machines. During the implementation of the transformation, uses the intelligent motor control system to replace the original power distribution system, has realized the full-time stable control and effectively saved the active power of the motor. At the same time, the built-in solid-state intelligent soft start has improved loading start performance of the equipment. In this practical case, the active power saving rate is 21%, and the annual power saving is 26,850kWh.



Case II

Combining the characteristics of plastic crushers, two 15kW plastic crushers have been transformed for energy saving. During the implementation of the transformation, uses the intelligent motor control system to replace the original power distribution system to achieve stable control of the plastic crushers. In this practical case, the effective power saving rate of the plastic crushers is 27% and 45% respectively, annual power saving is about 9132kWh. ■



BAT3:Energy-saving Control Chip Technology on Body Voltage Sensor

1. Technical principle

The energy-saving control chip technology on body voltage sensor chooses to use an adjustable threshold four-terminal module, which is implanted in electrical appliances with standby power consumption, reducing the original standby power consumption of AC electrical appliances to zero, and the electrical appliances can start-up instantly by touch or light touch through human body induction voltage. The core technology is the four-terminal control technology, the source S and the substrate electrode B of the common three-terminal MOSFET (metal-oxide semiconductor field effect transistor) are opened up by a special process, a bias voltage VBS is added between the above mentioned two electrodes, which makes the MOSFET threshold voltage V_{th} has changing. The chip technology on body voltage sensor, adopts the modules of the above technology to implant into electrical appliances, realizes Zero power consumption of the appliances and the module after powering off the electrical appliances, and the electrical appliances can be

instantly activated by touch/light touch through human body induction voltage, without changing the original function of the electrical appliances to realize the energy-saving effects that no power consumption in standby mode of the appliances.

2. Main technical specifications

Applicable electrical parameters A.C. 100V~240V, 50Hz/60Hz. Standby power consumption is 0 (the current standby power consumption of existing appliances is above 0.5 watts).

3. Energy conservation effects

Without changing the original functions of the electrical appliances, realizes zero power consumption in standby mode.

4. Application areas

Applicable to civil, industrial and other AC electrical appliances that have standby power consumption, in which, civil appliances include air conditioners, washing machines, TV sets, set-top boxes, computers, monitors,

stereos,microwave ovens,induction cookers,rice cookers,kettle s,dishwashers,humidifiers,etc. products that have standby power consumption.

5.Technical Application Case

Case I

Using zero consumption power strip/socket to solve the problem of standby power consumption is applicable for old electrical appliances. When the electrical appliances are plug in the zero consumption power strip/socket,the standby zero power consumption can be realized without changing the original electrical system structure.

A company uses Energy-saving control chip technology on body voltage sensor to modify old household appliances (air conditioners,televisions,desktop computers,washing machines,electric water heaters) in a residential area,total 4680 households. After the modification,the standby power consumption is all reduced to 0W,and the turning on and off functions of the electrical appliances are normal. Annual power saving is 362.8kWh per household,and the total power saving is 1.698 million kWh of this residential area annually.

Case II

A resort area uses the energy-saving control chip technology on body voltage sensor to modify a total of 352 electrical devices,such as air conditioners,televisions,computers,range hoods,substation consoles,and security systems. After the modifications,the standby power consumption of all the electrical devices is reduced to 0W,annual power saving 16,400 kWh. ■



BAT4: Organic Rankine Cycle (ORC) Screw Expanding Generation System

1. Technical principle

Organic rankine cycle (ORC) screw expanding generation system combines organic Rankine cycle with screw expander for application, the entire system includes evaporator (including preheater), expander, condenser, liquid pump, uses R245fa as the working fluid. When recycling low-grade waste heat, the hot fluid heats the liquid working fluid of the expander when passing through the evaporator, produces high-temperature and high-pressure working fluid steam that enters the expander to push the expander to work, and then, the low-temperature and low-pressure working fluid discharged from the expander enters the condenser, releases heat to the environment and condense into liquid, and then the liquid is pumped into the evaporator to evaporate, thus completing a complete cycle.

Screw expander is a positive displacement expander, with compact structure, high strength, not easy to damage, extreme

strong variable working conditions' capabilities, able to run in stable operation within the load range of 10%~120%, suitable for residual heat, waste heat and other parameters with big variations energies' recycling and utilization.

2. Main technical specifications

For flue gas at 120°C~250°C, low/normal-pressure steam, and low-grade waste heat such as hot water at 80°C~160°C, the ORC unit's power generation efficiency is 8%~12%.

3. Energy conservation effects

The isentropic efficiency is as high as 85%-88%, and the thermal net power conversion efficiency is as high as 8.4%~12.8%.

4. Application areas

Low-grade waste heat utilization in machinery industry, building materials, chemicals, metallurgy, textiles, kilns, etc.

5. Technical Application Case

Comprehensively considering the heat source conditions of the implementing project and the development level of ORC waste heat generation technology, in order to improve the thermal efficiency and total power generation capacity of the hot water generator set, this project adopts the ORC screw expansion generator set, realizes the hot water side pressure drop is not greater than 0.1 MPa.

According to 643 tons of 115°C hot coal water that produced by the project owner, one ORC generator set is configured to achieve the net power generation of 2570kWh, which annual power generation is 20.56 million kWh, annual power generation benefits of 14.392 million RMB, equivalents to 7196 tons of standard coal, 17,097.7 tons of CO₂ emission's reduction. The ORC system is equivalent to a main

cooler, which is a parallel connection with the air cooler in the original system, with split-range control. When the ORC is running, almost all the hot water flows through the ORC system for cooling, which saves power consumption of the original air cooler while generating electricity. when the ORC is out of service, the hot water flows through the original air cooler for cooling. ■



BAT5: Energy Saving Technology of New Steady Flow and Heat Preservation Aluminum Reduction Cell

1. Technical principle

The energy-saving technology of new steady flow and heat preservation aluminum reduction cell, through simulation and theoretical calculation, optimizes the current distribution in the molten aluminum, reduces the flow rate and interface deformation of the molten aluminum, optimizes the current distribution in the cathode carbon block, improves the stability of the cathode aluminum liquid. Through optimizing the cathode structure and material selection, developing stable current and high-conductivity steel rods, combined with low cathode voltage drop assembly technology, reducing the cathode voltage drop and cell voltage. Through analyzing the self-consumable energy in the reduction cell area and the primary crystal temperature of electrolyte composition, optimizes the design of cell lining, optimizes the distribution of isotherms, forms an ideal furnace chamber, and reduces

the heat dissipation of the side lower part. Through reasonable configuration of the process technical parameters of the reduction cell, to finally achieve the purposes of stabilizing the fluctuation of the molten aluminum, reducing the horizontal current and the cell voltage, reduces the heat dissipation of the side lower part, to ensure stable operation of the reduction cell under low voltage and high efficiency, and reduces power consumption.

2. Main technical specifications

By this technology, the graphitized cathode experimental electrolytic cell aluminum liquid DC power consumption reaches 11805 kWh/t-Al, the average operating voltage after promotion is about 3.85V, the current efficiency is above 92%, the series aluminum liquid DC power consumption is below 12,500 kWh/t-Al. Compared with the current average level of the industry, it can save more than 500 kWh/t-Al, and the power utilization rate will

increase by 4%~5%.

3. Energy conservation effects

Compared with which before the technology is applied, the DC power consumption of molten aluminum is reduced by 500kWh.

4. Application areas

It is implemented for new or overhauled reduction cells in the aluminum smelting industry that uses alumina as raw material to produce electrolytic aluminum.

5. Technical Application case

This case involves 200 electrolysis cells with cell types of 400kA and 320kA, performs the energy-saving technical transformation with the new steady-flow and heat-preserving aluminum electrolysis cell. The main technical modifications include lining optimization, cathode optimization, furnace building management, process parameter matching, etc., The investment is 16 million RMB, and the construction period is 24 months.

After the implementation of the project, the DC power consumption is reduced from 13115 kWh/t-Al to 12450kWh/t-Al, the average operating voltage is reduced to 3.82V, the current efficiency is 91.4%, the power saving 665kWh per ton of aluminum, and the annual power saving benefit is about 84 million

RMB, equivalent to about 64,000 tons of standard coal, reducing carbon dioxide emissions by about 150,000 tons, and the accumulated economic benefits of about 93 million RMB. ■



BAT 6: Energy Saving Technology of Liquid Cooling and Heat Conduction in Electronic Equipment

1. Technical principle

Energy saving technology of liquid cooling and heat conduction in electronic equipment adopts the combination of heat pipe technique and water-cooling technique, couple the heat pipe cold-plate module with the server to achieve chip-level cooling, most of the heat generated by the server's high-heat-flux is conducted out of the server cabinets through the contact cooling channel by using this technology, a small part of the remaining heat is taken away through the non-contact cooling channel by traditional air-cooling technology, and then the heat of the cold-plate is continuously transferred to the plate heat exchanger through the internal circulating refrigerant conduction system, and then the heat is carried out to the cooling tower and dissipated naturally through the external circulating water cooling system. This technology does not require air-conditioning compressors in whole process, and

the power usage efficiency of data center is greatly reduced, realizes data center energy saving effectively.

2. Main technical specifications

The energy consumption of the refrigeration system of this technology is reduced by more than 80% compared with the traditional refrigeration system, accounting for only about 10% of the total energy consumption of the data center. the working temperature of the server CPU under the full load condition is lower than 60°C. the single rack installed capacity is adapting 5kW ~ 25kW.

3. Energy saving effects

This technology reduces the data center power usage efficiency to below 1.2, realizing energy saving about 40% in the data center.

4. Application areas

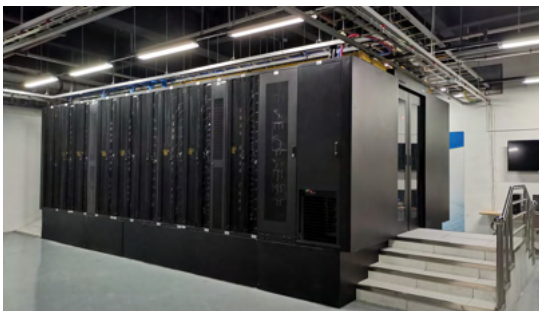
This technology is applicable for heat dissipation in data

centers and communication rooms of government,communication operators,IDC enterprises,Internet,finance etc. industries,also can be used in high-heat-flux cooling fields such as supercomputers ,radars,lasers,large industrial control equipment,and LED large screens.

5. Technical application Case

Case I

The cloud computing business of data center has the characteristics of high density and high energy consumption. the huge amount of data and calculations causes the power density of the server increasing greatly,so there are higher requirements for the cooling of data centers. One cloud computing center of a certain base has implemented the technology of liquid cooling and heat conduction in electronic equipment to solve the high-density heat dissipation problem of servers. The energy saving effects of the first phase of the project is good. The data center's electric energy usage efficiency is below 1.2. The annual power saving of the project is 588,672 kWh. The project gains annual power saving benefits of 529,800 RMB that is calculated by 0.9RMB/kWh. During operation,there is no air-conditioning compressor required in whole process,and the maximum operating temperature of the CPU of the heat pipe water-cooled server does not exceed 44°C.



case II

The IDC of a certain base owns a whole cabinet application system platform,has integrated multi-type servers from many mainstream server manufacturers,including box type,blade type,whole cabinet type,etc.,which has many issues,such as high-heat-flux components of the server (such as CPU) account for a large proportion of heat,the heat distribution is relatively concentrated etc.

After implementing the technology of liquid cooling and heat conduction in electronic equipment in the base,the power consumption of the data center's computer room cooling system has dropped from 40% to 10%. Long-term running test results indicate that,under the condition of the wet-bulb temperature lower than 30°C,the server with actual power consumption of 4 racks totals 20kW (Note: After the 2nd time system expanding,the maximum installed power of the server reaches 48kW) as the load of IT business,achieves the effects that the CPU temperature is less than or equal to 60°C,and the power usage efficiency is less than 1.2.■



BAT7: Energy Balance and Scheduling Optimization Technology for Industrial Enterprises

1. Technical principle

Aiming at energy media such as steam, gas, hydrogen, water, wind, and electricity in industrial enterprises, uses a large real-time database to build a smart energy management and control platform, multi-energy media production - consumption forecast technology that combines time series and soft-sensing ideas, multi-period optimal scheduling method of energy system based on multi-energy media production-consumption forecast data and overall collaborative balance model, uncertainty mixed integer nonlinear programming solution technique, establishing an intelligent simulation of energy pipe network and energy system collaborative balance model, developing fuel-steam-power system multi-period collaborative balance and optimizing scheduling platform and software for large-scale processing enterprise, effectively improves the accuracy of

simulation and forecasting, quickly, stably, and accurately provides an optimized scheduling plan, realizes multi-period collaborative optimized scheduling of energy media.

2. Main technical specifications

The production - consumption forecast accuracy of the main energy medium is greater than 95%, the pipeline network simulation accuracy of the main energy medium is greater than 95%, the matching degree of the energy optimized scheduling model calculation result vs. actual state is more than 95%, the comprehensive energy consumption is reduced by more than 1.5%, and the waste gas emission is reduced by 5% or the above.

3. Energy conservation effects

Gas, coal gas, and steam emissions are generally reduced by 5%~10%. At present, this technology can achieve

energy saving about 530,000 tce/a.

4.Application areas

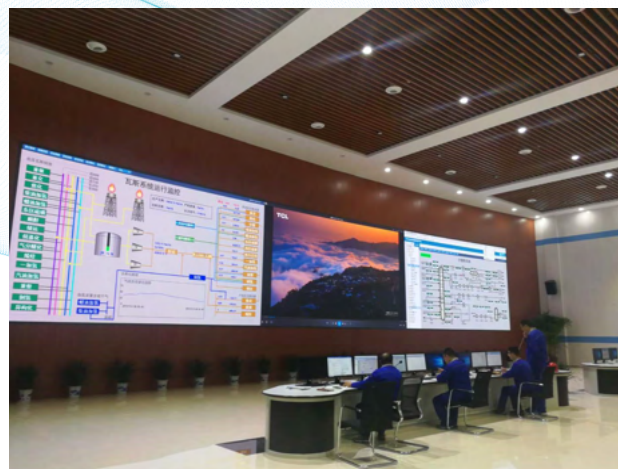
Applicable for high energy-consuming industries,such as petrochemical,chemical,non-ferrous,building materials.

5.Technical Application Case

Case I

A petrochemical company has low utilization rate of hydrogen resource,large steam energy loss,frequent gas system fluctuations,etc. problems,by establishing a hydrogen,steam,and gas balance and optimization system that integrates real-time monitoring,statistical analysis,pipeline network simulation,scheduling optimization etc. functions,has effectively improved the enterprise informatization and intelligence level,realized the refined management and control of production,transportation,consumption,storage,etc.,reduced labor intensity,and provided a powerful support tool for improving the level of scheduling management and reducing operation costs of the system,has changed the traditional extensive management concept,continuously optimized production through simulation optimization,data analysis etc. methods.

After the expanding diameter renovation of thermal to wax oil hydrogenation,Low pressure of olefin delivery,Low pressure of Maleic anhydride conduction,the turbine working performance has been improved,creates benefits of 530,400 RMB/year,693,600 RMB/year,and 370,800 RMB/year respectively.



case II

A refining and chemical branch company carries out hydrogen and gas balance and optimization in accordance with the current operating status and business characteristics of the hydrogen and gas system in a certain district. This case uses mechanism modeling,data mining,optimization calculations and other techniques,has built up a informatic system that integrates real-time monitoring,statistical analysis,pipeline network simulation,production - consumption forecast,operation optimization,scheduling optimization etc. functions,concentrates on key points of production,consumption,and recovery of hydrogen and gas systems,has realized the fine control of hydrogen and gas,realized the optimized operation and running based on the model.

Aims to the technical problem that it is difficult to identify and supervise abnormal low-pressure gas emissions,the project uses big data analysis techniques such as pattern recognition to construct the low-pressure gas abnormal emission recognition model,has realized

the pattern recognition of low-pressure gas abnormal emission, effectively improved the supervision of low-pressure gas abnormal emissions, reduced fuel consumption in the refining process. Based on the optimization model of the hydrogen devices and the optimization model of the heating furnace operation, guiding the operation process optimization for production equipment, has improved the operation efficiency of the heating furnace, reduced the loss of hydrogen resources, and reduced the waste hydrogen emissions of the hydrogen devices, supports the energy conservation and emission reduction and tapping the

potential and improving efficiency in the enterprise.

After the implementation of this project, it has reduced fuel gas consumption accounts for about 1.0% of the total fuel gas consumption, saved 350 Nm³/h of fuel gas resource consumption, and reduced low-pressure gas emissions by 2255 Nm³/h. It effectively improves the refined management of hydrogen resources, reduces the company's hydrogen resource consumption, improves the utilization of hydrogen resources, reduces the fluctuation of the hydrogen pipeline network, has reduced the hydrogen emission loss by 702 Nm³/h. ■

BAT8: Waste Heat Recovery from Industrial Waste Water by Low Vacuum Phase Change Principle

1. Technical principle

The technology of waste heat recovery from industrial waste water by low vacuum phase change principle, flashes medium - high temperature waste water, generates negative pressure steam and transports the vaporized latent heat to the condenser to release heat to low-temperature media (such as heating water), realizing heat exchange between industrial wastewater and low-temperature fluids without wall contact, solves the technical problems such as corrosion, crystallization, scaling and blockage of traditional recuperators as well. Multi-stage continuous flashing heat exchange technology is adopted to realize large temperature difference heat exchange, improves heat transfer efficiency, reduces system energy consumption, and maximizes the

utilization of industrial wastewater heat.

2. Main technical specifications

Rated heat 5000kW. unit input power 17.2kW.
condenser heat transfer coefficient $\geq 1800 \text{ W}/(\text{m}^2 \cdot ^\circ\text{C})$.
condenser slag water side/system water side pressure drop 47.4KPa/60KPa.

3. Energy conservation effects

Using waste heat recovery to replace traditional coal boilers (boiler thermal efficiency is calculated as 70%), the energy saving rate is above 90%.

4. Application areas

This technology can be applied to industrial waste heat recovery in petrochemical, coal, power, steel, metal lurgy, textile, papermaking and other industries, supply

industrial and domestic hot water, or heating buildings.

5. Technical Application Case

A steel company, Ltd. extracts waste heat from blast furnace slag water as the heat source to provide heating services for the surrounding area by using this technology. While the waste heat is recovered, the circulation temperature of the slag flushing water is reduced, the stability of the blast furnace slag flushing is improved, and utilizes the characteristics of phase change heat extraction, effectively recovers part of the moisture that originally evaporated into the air environment.

The overall installed capacity of the system is 57.5MW, which meets the heating demand of 170,000 m² in the plant and 530,000m² outside the plant. The project recovers a total of 1.043 million GJ of waste heat in one heating season. By using industrial waste heat system for heating, the annual energy consumption is reduced by about 50,000 tons of standard coal and the emission of atmospheric pollutants such as CO² and SO² by nearly 130,000 tons. ■



BAT9: Energy-saving Copper Rotation-floatation Smelting Technology

1. Technical principle

Energy-saving copper rotation-floatation smelting technology strengthens the mixing of oxygen-enriched gas and material particles through rotation flow, and at the same time strengthens the secondary reaction of peroxide particles and suboxide particles produced by the primary reaction, enhances the heat and mass transfer process in the flame zone, ensures sufficient complete reaction. Based on this principle, it has researched and developed core equipment, such as cyclone pulsating nozzles, intelligent production mathematical model, and corresponding computer online control system to realize intelligent rotation-floatation smelting and self-heating smelting

2. Main technical specifications

The material feed rate is increased from 200t/h to 350t/h, the maximum annual production capacity of a single furnace can be increased to 500,000 tons, the heat load of the reaction tower is $2600\text{MJ}/\text{m}^3\cdot\text{h}\sim 2900\text{MJ}/\text{m}^3\cdot\text{h}$, and the

operation rate of the smelting furnace and converting furnace reaches 98% and 97% respectively, the comprehensive energy consumption of blister copper is 150kgce/t, and the copper matte grade can reach 70%.

3. Energy conservation effects

Compared with the technology before its implementation, the natural gas consumption has dropped by more than 50%, and the comprehensive energy consumption of blister copper has dropped by about 20% compared with the industry average level.

4. Application areas

Applicable in the copper smelting industry that uses copper concentrates as raw materials to produce matte.

5. Technical Application Case

A copper industry co., Ltd. build a 400,000-ton copper smelting plant newly, using energy-saving copper

rotation-floatation smelting technology - Rotation
- floatation smelting and converting process &
equipment, which production is stable with high
efficiency and significant energy saving effects.
Calculated by annual output of 400,000 tons cathode
copper, the natural gas saving is 57,143kNm³
annually, equivalent to 76,000 tons of standard
coal, CO₂ emission reduction of 118,560 tons, has
achieved good environmental and social benefits. ■



BAT10: Modular Cascade Regenerative Clean Combustion Coal Gasification Technology

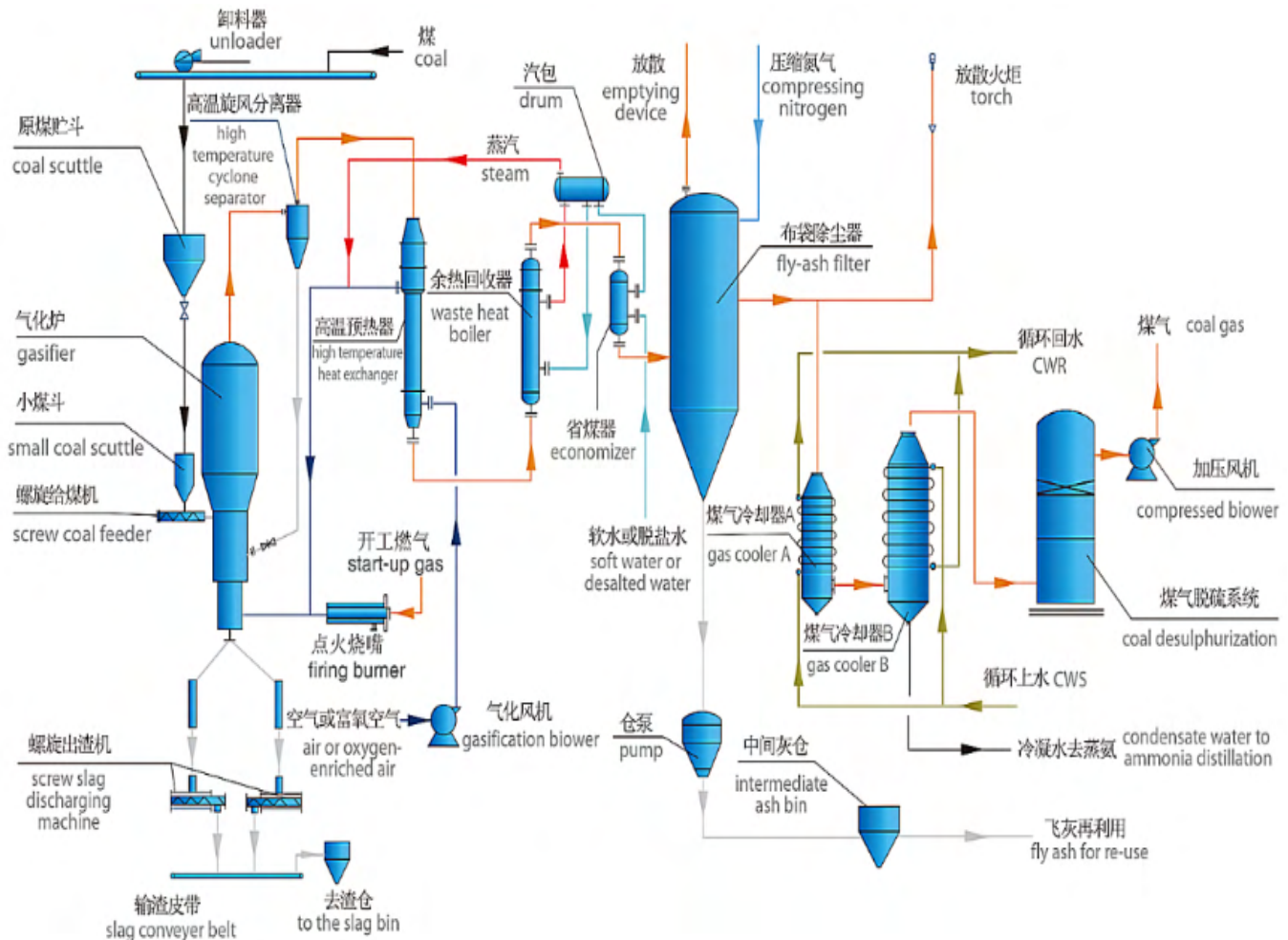
1. Technical principle

Modular cascade regenerative clean combustion coal gasification technology is a process that uses crushed coal and pulverized coal as raw materials to produce coal gas, based on the principle of circulating fluidized bed gasification. Utilizes the advantages of sufficient mixing and temperature evenness of the fluidized reactor, adopts 'cascade waste heat recovery' technology, optimizes the heat exchange step of the gasification system, and the large amount of waste heat of the crude gas is utilized to generate high-temperature gasification agent to achieve 'high-temperature combustion supporting', has reduced the irreversible loss of the reaction and improved the efficiency of cold coal gas. In addition, under the condition of higher reaction temperature, the volatiles of the raw coal are

decomposed by heating, the heavy hydrocarbons are decomposed more completely, the crude gas contains no tar, thereby reducing the difficulty of purification. This technology can also configure the fly ash forced circulation module and the coupled gasification module to proceed the secondary utilization of the incompletely converted residual carbon, thereby achieving an ultra-high carbon conversion rate, and further improving the cold gas efficiency of the system.

2. Main technical specifications

The primary carbon conversion rate is 85%~90%, the primary cold gas efficiency is 70%~80%, the comprehensive carbon conversion rate is 95%~99%, the comprehensive cold gas efficiency is 80%~90%, and the thermal efficiency is $\geq 90\%$.



3. Energy conservation effects

The traditional fixed-bed gasification process will produce a large amount of tar that is easy to block equipment and pipelines, causes difficulties to recycle the waste heat in the production process, which carbon conversion rate is only 70%~80%, cold gas efficiency is only 60%~70%, unconverted carbon and heat loss are discharged into the environment, causes a lot of energy waste. This technology not only effectively improves the thermal efficiency and cold coal gas efficiency of the system through adopting cascade waste heat

recovery and utilization, forced circulation and coupled gasification etc. techniques, but also avoids the black water creation, gains good environmental benefits.

4. Application areas

Applicable in high energy consumption industries such as building materials, metallurgy, and chemical industry.

5. Technical Application Case

Case I

A chemical company has deployed multiple sets of

oxidation furnace,roasting furnace and equipped with circulating fluidized bed coal gasification devices in the two phases of the project engineering. After the project implementation,it can filter fine dust above $0.5\mu\text{m}$,the dust collection efficiency reaches 99.99%,which dust density is less than $10\text{mg}/\text{Nm}^3$,the thermal value is $\geq 1385\text{kcal}/\text{Nm}^3$,the H_2S concentration is less than $50\text{mg}/\text{m}^3$,and the carbon conversion rate under normal pressure is 86%~90%,coal processing capacity (single furnace) reaches 67t/h.

According to calculations,after the transformation of implementing circulating fluidized bed,it reduces coal consumption is equivalent to 30,094 tce of standard coal,the annual comprehensive energy consumption is reduced by 26,550 tce.

This project has annual clean coal gas output of 1,166.4 million Nm^3 ,which saves 83,498 tce of coal per year,compared to traditional fixed-bed water gas furnaces,gains energy saving benefits of 50.1 million

RMB a year,that is calculated by standard coal unit price of 600 RMB/ton.

Case II

An aluminum company adopts several sets of fluidized bed gasification systems,and the DCS control system is configured to realize the remote control of the gasification system,pressurization system,pneumatic conveying system,desulfurization system,water treatment system and other major systems,able to perform real-time measurement of coal consumption,water consumption,and power consumption in production.

This project has annual clean coal gas output of 1,036.8 million Nm^3 ,which saves 74,221 tce. of coal per year compared to traditional fixed-bed water gas furnaces,gains energy saving benefits of 44.53 million RMB a year,that is calculated by standard coal unit price of 600 RMB/ton. ■

