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Steel strip online heating equipment technology

technique elucidate describe

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1. I. Overview
2. With the rapid development of my country's industrial modernization process, the field of industrial heating is also undergoing rapid changes. In recent years, due to the country's increasingly high environmental protection requirements for enterprises, as well as the rising prices of coal and oil, the use of coal and oil heating not only does not meet environmental protection requirements, but also greatly increases production costs, directly affecting corporate interests and products. Market Competitiveness. Saving energy, reducing consumption and reducing costs have become issues of great concern to enterprises. Therefore, according to the market demand, our company adheres to the principles of high technology, high starting point and high quality, relying on years of scientific research innovation and excellent technical strength, and takes the lead in developing ultra-audio induction quenching equipment in China.

3. Its product technical features are: using Siemens IGBT as the main component, large capacitor filtering, full-bridge inverter, equipped with multi-channel closed-loop control and protection control, using phase-locked loop control, fully automatic tracking, completely subverting the traditional high-frequency can not be empty With a long history, the heating efficiency of the equipment has been greatly improved. The new protection functions include (over current, over pressure, water temperature, water pressure, phase loss). This equipment complies with the internationally accepted 3S standards (SURE, SAFE, SAVING) and 3C standards (COOL low temperature, CLEAN, CLAM).), thus fundamentally reforming the traditional high and medium frequency heating equipment characterized by thyristors and electron tubes.
4. Its main advantages are:
5. 1. Significant power saving: 20% power saving compared to thyristor medium frequency and 30% power saving compared to electronic tube high frequency
6. 2. Easy to install and operate.
7. 3. The sensor is isolated by a transformer for safety.
8. 4. Environmental protection: no pollution, noise and dust. Low failure rate: components are strictly screened and tested to ensure stable operation of the equipment.
9. 9. Reduce the impact and pollution of harmonics on the power grid.

2. All-solid-state induction heating equipment

1. Main features of the equipment:

1.1 Using IGBT, an internationally advanced device instead of old-fashioned thyristor, the efficiency is 30%-40% higher than the old-fashioned thyristor IF, and the power is saved by 30%-40%.

1.2 This equipment is a series resonant circuit topology, and the inductor is an isolated floating voltage, which is safe; while the thyristor intermediate frequency is a parallel resonance, and the inductor is a direct voltage of 500V. If the insulation is damaged and gets damp, it may be unsafe.

1.3 This equipment adopts the most advanced PWM control in the world, which adjusts power by power ratio. No reactor is needed on the grid entry side, and no pre-stage power-adjusting thyristor is needed. It has little impact on the power grid and other equipment; while the thyristor intermediate frequency uses a reactor to smooth the wave and the front-stage thyristor to adjust the power, the harmonics are serious, causing serious harmonic interference to the power grid and equipment on the same network.

1.4 This equipment is equipped with comprehensive closed-loop protection, and the protection speed is nanosecond level: (1/1000000 second level) to ensure that the main circuit of this equipment operates normally and the main components are not damaged. SCR-type intermediate frequency often burns out

expensive fast-acting fuses and SCRs.

1.5 This equipment is equipped with a comprehensive protection circuit. Such as water temperature, water pressure, voltage, current, etc. to ensure the normal operation of the equipment.

1.6 This equipment has fast heating speed, high production efficiency, easy mechanization and automation, and can be easily connected with the next process equipment to achieve synchronized and synchronous production.

1.7 This equipment complies with the internationally accepted 3S standards (SURE, SAFE, SAVING) and 3C standards (COOL low temperature, CLEAN, CLAM)2、Technical parameters of ultrasonic audio equipment:

Working power supply	Three-phase 380V/50HZ	Cooling water flow	38L/Min(0.1Mpa)
Working voltage range	360V～420V	cooling water pressure	0.1～0.3MPa
Maximum input current	600A	Water temperature protection point	50℃
Maximum output power	450KW	weight	
Oscillation frequency	5-20KHz	Host size (mm)	500kg
efficiency	95%	Transformer size (mm)	
load duration	100%	Special recommendation	1070×640×1780 (main)

3. Main component suppliers of induction heating equipment

No	Name	Supplier	Origin
1	IGBT	Infineon	Germany
2	Rectifier bridge	Shenshe	Changzhou
3	Potentiometer	Bourns	Shanghai
4	relay	Tracy	Zhejiang

5	AC contactor	Tracy	Zhejiang
6	Connector	Motorola	USA
7	snubber capacitor	Hong Ge	Wuxi
8	filter capacitor	Hong Ge	suzhou
9	power capacitor	Antai	Zhejiang
10	integrated circuit	Texas Instruments	USA
11	integrated circuit	Texas Instruments	USA
12	fan	Bader	Shenzhen
13	magnetic core	Sanlian Magnetic Industry	Xi'an
14	indicator light	red wave	Zhejiang
15	control button	red wave	Zhejiang
16	Copper	Luotong	Luoyang

4. Principle of selection of induction heating

Induction heating principle

According to Faraday's electromagnetic induction theorem and Lenz's law, when the coil passes through the alternating current, an alternating current will be generated.

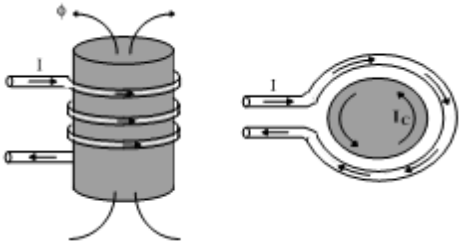
Variable magnetic field, if magnetic or non-magnetic conductive processing objects are placed at the intersection inside the heating coil reduction

In a variable magnetic field, due to the cutting of magnetic lines of force, induced current Ic (i.e.

Eddy current), and due to the impedance characteristics of the workpiece and the flow of eddy current on the workpiece, Ic^2*R

The heat is used to increase the temperature of the processed object to achieve the purpose of heat treatment. This is induction heating.

The basic principle and working principle architecture are shown in the figure. where I is the current flowing through the heating coil,



Ic is the induced eddy current.

Basic principles of induction heating

Transformer output frequency selection

The skin depth of a cylindrical machined object can be obtained from

$$\delta = \frac{1}{2\pi}\sqrt{\frac{\rho \times 10^9}{\mu_r f}} = 5033\sqrt{\frac{\rho}{\mu_r f}}$$

Maxwell's equation

(1-1)

Among them, δ: heating depth (cm)

P: Resistivity of the processed object (Ω*cm)

: Relative magnetic permeability coefficient

f: Frequency of current passing during heating (Hz)

Since 86.5% of the heating power is concentrated within the skin depth position, the choice of frequency is critical to the induction

The efficiency of heating has a big impact. A metal cylinder of diameter D is placed into a uniform magnetic field to generate

When a coil is used for induction heating, the power absorbed by the cylinder per unit length can be expressed by the following formula:

$$P = 2\pi^2 H_0^{\ 2} D\sqrt{\mu_r \rho f \times 10^{-9}}\, k \qquad (1\text{-}2)$$

Among them, P: the power absorbed by the unit length cylinder (W/cm)

Ho: average magnetic field strength on the conductor surface (A/cm)

D: Diameter of cylindrical conductor (cm)

K: Correction coefficient less than 1, a function of D/2δ. When D/2δ=2, K=0.65,

When D/2δ<2, the K value decreases rapidly. It can be seen from the above formula that when the magnetic field intensity is constant, the electric power P

is proportional to and K value. The closer the K value is to 1, the greater the power P obtained.

The higher the thermal efficiency. In order to improve the heating efficiency, D/2δ must be increased, that is, when the D value is constant,

The smaller δ is, the better. The δ value is inversely proportional to $\sqrt{f}$. To reduce δ, f must be increased. But not unlimited

The use of reducing δ to improve efficiency. We use D/2δ=5 as the lowest limit to calculate the heating electricity

The operating frequency of the source, when its value is substituted into (1-1), we get:

$$f \geq 25\times10^{8}\frac{\rho}{\mu_r D^2}\ (Hz)$$

However, during induction heating, the uniformity of the heating temperature also needs to be considered. Taking D/2δ=2, we get:

$$f \geq 4\times10^{8}\frac{\rho}{\mu_r D^2}$$

5. Closed cooling tower system

Main configuration parameters of 40T closed cooling tower:

project		unit	闭式冷却塔
model		YCN-100B	100T
cooling capacity		Kcal/h	400000
flow		Host M³/h	32
power supply			380V-50Hz
Pipe diameter		Water inlet (mm)	DN80
		Water outlet	DN80
		Water	DN20
		Sewage outlet	DN20
fan	Motor power,	kW、set	1.5*2
Spray pump	power	kW、et	2.2
circulation pump	power	KW	7.5
	Lift	m	32
	flow	m3/h	60
Dimensions	length, width,	host：2750*1500*2250mm co：1000*1000*2000mm	

Heat exchange tube	Material	stainless steel pipe	304 stainless steel pipe Φ16×0.6
self-respect	1300KG		

6. Quality assurance measures and service commitments

1. Quality assurance measures

1. Careful design, standardized production of components, and strict debugging.

2. The components are selected from famous international and domestic brands, and the main accessories are produced by designated manufacturers.

3. Strict process quality inspection, the company puts forward the overall requirement of "quality: the conscience and moral character of the enterprise". The production, management, process, and quality inspection departments monitor product quality at all levels, strengthen inspections between processes, and strictly carry out factory inspections to ensure product quality.

2. Service commitment

1. Provide complete equipment and related information on schedule and with guaranteed quality;

2. Free training for purchaser's equipment operation and maintenance personnel;

3. Responsible for on-site debugging;

4. Responsible for simple packaging of equipment;

5. The free warranty period for the equipment is one year;

6. After the warranty period expires, technical maintenance will be provided for life.

6 Equipment photos

Quotation of the system

序号	Name	规格	Specification	Price USD	Amount USD	FOB Tianjin port
1	Tempering heating equipment	YCC-450KW	1 set	15950	15950	
2	Paint heating furnace	YCC-200KW	1 set	9850	9850	
3	Drying wax heating furnace	YCC-200KW	1 set	9850	9850	
4	Closed cooling tower	YCN-100t	1 set	12980	12980	
5	sensor	custom made	3 p		48630 USD	
Delivery: 30 days after contract Packing: 40 feet container one Price term FOB Tianjin port						
					Quotation is effective within 30 days	