Nano Infrared Electric Heating Ring

Relevant Certificates

National Patent No.: ZL 2009 2 0050337.8
ZL 2008 2 0049678.9
ZL 2009 2 0050336.3
RoHS Certificate
CE Safety Certificate

Product Features

1.Most excellent mode of heat transfer and high energy conservation rate;
2.High precision temperature control and small heat inertia;
3. Fast heating-up time and high heating efficiency;
4. Easy to install, capable of replacing existing electric heating rings directly;
5. Super low surface temperature helps improve operating conditions;
6. Long service life and two-year warranty period.

Specifications & Scope

We can customize any type and dimensions according to users' requirements.

Application Scope

It is applicable in plastics and rubber machinery including injection molding machine, granulating machine, extruding machine, drawing machine, film blowing machine etc.

Product Introduction

NEZOY Nano infrared energy-saving electric heating ring is an auxiliary heating device for plastics and rubber machinery, which is independently developed by NEZOY. It adopts a new type of nano infrared heating element with thermoelectric conversion efficiency up to above 99.8%. And it adopts infrared mono-direction radiation as conduction way, which greatly improves heat transfer efficiency between heating elements and stuff canister. The heating ring adopts aerogel felt with heat transfer coefficient as low as 0.013w/m.K to ensure the surface temperature of heating ring does not exceed 70°C. Its three generation of thermal radiation protection coating ensures the surface temperature of the ring as low as 50°C, which helps improve the fatal disadvantage of conventional heating rings such as low thermoelectric conversion efficiency, low heating efficiency, high surface temperature, so the heating ring not only helps achieve energy conservation of more than 30%, but improve the operating environment of the workshops.

Mechanisms

The fundamental modes of heat transfer are:

Advection

Advection is the transport mechanism of a fluid substance or conserved property from one location to another, depending on motion and momentum.

Conduction or diffusion

The transfer of energy between objects that are in physical contact. Thermal conductivity is the property of a material to conduct heat and evaluated primarily in terms of Fourier's Law for heat conduction.

Convection

The transfer of energy between an object and its environment, due to fluid motion. The average temperature, is a reference for evaluating properties related to convective heat transfer.

Radiation

The transfer of energy from the movement of charged particles within atoms is converted to electromagnetic radiation.

Advection

By transferring matter, energy—including thermal energy—is moved by the physical transfer of a hot or cold object from one place to another.[8] This can be as simple as placing hot water in a bottle and heating a bed, or the movement of an iceberg in changing ocean currents. A practical example is thermal hydraulics.[citation needed] This can be described by the formula:

$$Q = v\rho c_p \Delta T$$

where Q is heat flux (W/m²), ρ is density (kg/m³), c_p is heat capacity at constant pressure (J/(kg*K)), ΔT is the change in temperature (K), v is velocity (m/s).

Conduction

On a microscopic scale, heat conduction occurs as hot, rapidly moving or vibrating atoms and molecules interact with neighboring atoms and molecules, transferring some of their energy (heat) to these neighboring particles. In other words, heat is transferred by conduction when adjacent atoms vibrate against one another, or as electrons move from one atom to another. Conduction is the most significant means of heat transfer within a solid or between solid objects in thermal contact. Fluids—especially gases—are less conductive. Thermal contact conductance is the study of heat conduction between solid bodies in contact.[9]

Steady state conduction (see Fourier's law) is a form of conduction that happens when the temperature difference driving the conduction is constant, so that after an equilibration time, the spatial distribution of temperatures in the conducting object does not change any further.[10] In steady state conduction, the amount of heat entering a section is equal to amount of heat coming out.[9]

Transient conduction (see Heat equation) occurs when the temperature within an object changes as a function of time. Analysis of transient systems is more complex and often calls for the application of approximation theories or numerical analysis by computer.[9]

Convection

The flow of fluid may be forced by external processes, or sometimes (in gravitational fields) by buoyancy forces caused when thermal energy expands the fluid (for example in a fire plume), thus influencing its own transfer. The latter process is often called "natural convection". All convective processes also move heat partly by diffusion, as well. Another form of convection is forced convection. In this case the fluid is forced to flow by use of a pump, fan or other mechanical means.

Convective heat transfer, or convection, is the transfer of heat from one place to another by the movement of fluids, a process that is essentially the transfer of heat via mass transfer. Bulk motion of fluid enhances heat transfer in many physical situations, such as (for example) between a solid surface and the fluid.[11]Convection is usually the dominant form of heat transfer in liquids and gases. Although sometimes discussed as a third method of heat transfer, convection is usually used to describe the combined effects of heat conduction within the fluid (diffusion) and heat transference by bulk fluid flow streaming.[12] The process of transport by fluid streaming is known as advection, but pure advection is a term that is generally associated only with mass transport in fluids, such as advection of pebbles in a river. In the case of heat transfer in fluids, where transport by advection in a fluid is always also accompanied by transport via heat diffusion (also known as heat conduction) the process of heat convection is understood to refer to the sum of heat transport by advection and diffusion/conduction.

Free, or natural, convection occurs when bulk fluid motions (streams and currents) are caused by buoyancy forces that result from density variations due to variations of temperature in the fluid. *Forced* convection is a term used when the streams and currents in the fluid are induced by external means—such as fans, stirrers, and pumps—creating an artificially induced convection current.[13]

Convection-cooling

Convective cooling is sometimes described as Newton's law of cooling:

> *The rate of heat loss of a body is proportional to the temperature difference between the body and its surroundings.*

However, by definition, the validity of Newton's law of cooling requires that the rate of heat loss from convection be a linear function of ("proportional to") the temperature difference that drives heat transfer, and in convective cooling this is sometimes not the case. In general, convection is not linearly dependent on temperature gradients, and in some cases is strongly nonlinear. In these cases, Newton's law does not apply.

Convection vs. conduction

In a body of fluid that is heated from underneath its container, conduction and convection can be considered to compete for dominance. If heat conduction is too great, fluid moving down by convection is heated by conduction so fast that its downward movement will be stopped due to its buoyancy, while fluid moving up by convection is cooled by conduction so fast that its driving buoyancy will diminish. On the other hand, if heat conduction is very low, a large temperature gradient may be formed and convection might be very strong.

The Rayleigh number (Ra) is a measure determining the relative strength of conduction and convection.[citation needed]

$$Ra = \frac{g\Delta\rho L^3}{\mu\alpha} = \frac{g\beta\Delta T L^3}{\nu\alpha}$$

where

- g is acceleration due to gravity,
- ρ is the density with $\Delta\rho$ being the density difference between the lower and upper ends,
- μ is the dynamic viscosity,
- α is the Thermal diffusivity,
- β is the volume thermal expansivity (sometimes denoted *α* elsewhere),
- *T* is the temperature,
- ν is the kinematic viscosity, and
- *L* is characteristic length.

The Rayleigh number can be understood as the ratio between the rate of heat transfer by convection to the rate of heat transfer by conduction; or, equivalently, the ratio between the corresponding timescales (i.e. conduction timescale divided by convection timescale), up to a numerical factor. This can be seen as follows, where all calculations are up to numerical factors depending on the geometry of the system.

The buoyancy force driving the convection is roughly $g\Delta\rho L^3$, so the corresponding pressure is roughly $g\Delta\rho L$. In steady state, this is canceled by the shear stress due to viscosity, and therefore roughly equals $\mu V/L = \mu/T_{conv}$, where *V* is the typical fluid velocity due to convection and T_{conv} the order of its timescale.[citation needed] The conduction timescale, on the other hand, is of the order of $T_{cond} = L^2/\alpha$.

Convection occurs when the Rayleigh number is above 1,000–2,000.

Radiation

Red-hot iron object, transferring heat to the surrounding environment primarily through thermal radiation

Thermal radiation occurs through a vacuum or any transparent medium (solid or fluid). It is the transfer of energy by means of photons in electromagnetic waves governed by the same laws.[14] Earth's radiation balance depends on the incoming and the outgoing thermal radiation, Earth's energy budget. Anthropogenic perturbations in the climate system are responsible for a positive radiative forcing which reduces the net longwave radiation loss to space.

Thermal radiation is energy emitted by matter as electromagnetic waves, due to the pool of thermal energy in all matter with a temperature above absolute zero. Thermal radiation propagates without the presence of matter through the vacuum of space.[15]

Thermal radiation is a direct result of the random movements of atoms and molecules in matter. Since these atoms and molecules are composed of charged particles (protons and electrons), their movement results in the emission ofelectromagnetic radiation, which carries energy away from the surface.

The Stefan-Boltzmann equation, which describes the rate of transfer of radiant energy, is as follows for an object in a vacuum :

$$Q = \epsilon\sigma T^4$$

For radiative transfer between two objects, the equation is as follows:

$$Q = \epsilon\sigma(T_a^4 - T_b^4)$$

where Q is the heat flux, ε is the emissivity (unity for a black body), σ is the Stefan-Boltzmann constant, and T is the absolute temperature (in Kelvin or Rankine). Radiation is typically only important for very hot objects, or for objects with a large temperature difference.

Radiation from the sun, or solar radiation, can be harvested for heat and power.[16] Unlike conductive and convective forms of heat transfer, thermal radiation can be concentrated in a small spot by using reflecting mirrors, which is exploited in concentrating solar power generation.[17] For example, the sunlight reflected from mirrors heats the PS10 solar power tower and during the day it can heat water to 285 °C (545 °F).[*citation needed*]

纳米红外电热圈

认证相关：

国家专利号ZL200920050337.8

ROHs认证

En61000 CE认证　EN60519 Ce认证

产品特点：

1、最优热传导方式，节能率高；
2、温控精度高,热惯性小；
3、加热升温快，热效率高；
4、安装简单，可直接替换现有电热圈；
5、超低表面温度，改善作业环境；
6、使用寿命长，质保2年；

规格范围：

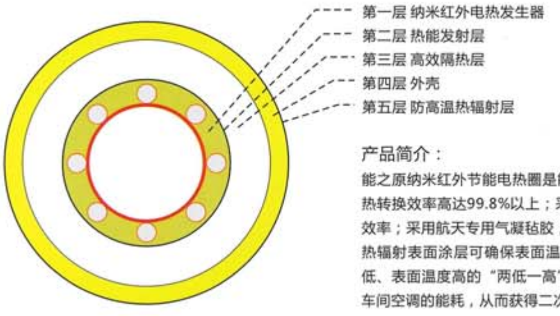
根据机型尺寸，量身定制

应用范围：

注塑机、造粒机、挤出机、拉丝机、吹膜机等塑胶机械

能之原纳米红外电热圈结构图

备注：圆形发热圈和方形发热圈均可订做



产品简介：

能之原纳米红外节能电热圈是能之原自主研发的塑胶机械辅助加热设备，采用新型纳米红外发热元件，电热转换效率高达99.8%以上；采用红外线单向辐射的传导方式，极大的提高了发热元件与料筒之间的传热效率；采用航天专用气凝毡胶，导热系数低达0.013w/m·K，保证电热圈的表面温度不高于70℃，第三代防热辐射表面涂层可确保表面温度低至50℃，从而从根本上改善了传统加热圈电热转换效率低、传热效率低、表面温度高的“两低一高”致命缺点，不但可实现节能30%以上，还可以改善车间的作业环境，降低车间空调的能耗，从而获得二次节能。

① 实用新型专利证书
② ROHs认证
③ Ce认证
④ 中国塑胶行业协会
最佳注塑机节能产品奖

①

实用新型专利证书

实用新型专利证书

②

AOV

TEST REPORT

A001C100805063001

③

VERIFICATION OF EMC COMPLIANCE

OMA Testing Certification

④

2010 CPPIA
创新+节能

广州能之原节能技术有限公司

贵司 能之原纳米红外节能加热圈 产品被评为

最佳节能注塑机产品奖

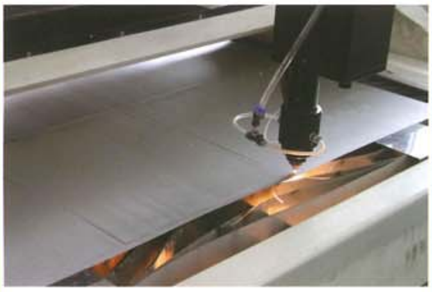
纳米红外电热圈生产线 — 中国规模最大

NEZOY 能之原

40道工艺流程

专业的生产施工人员

能之原纳米红外电热圈产品集



高精度金属激光切割机

严谨的工作环境

办公室5S执行标准

NEZOY能之原

整理 整顿 素养 清洁 清扫

整理 彻底将要的东西与不要的东西分清楚，并将不要的舍去。

整顿 在安全、品质、效率的情况下，将需要的东西以最简便的方式排放，一目了然。

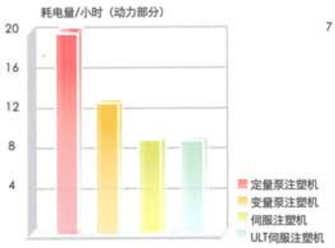
清扫 经常的打扫，保持干净，以造成没有垃圾污垢的办公环境。

清洁 维持整理、整顿、清扫等3S成果。

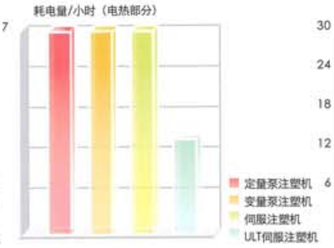
素养 遵守已规定事项，养成循规蹈矩的习惯。

注塑机能耗分析表 360T机型为例，同工艺、同制品、同周期、同机台四同原则测试结果

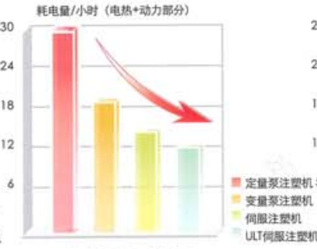
	特　点	能耗分析
（第一代）定量泵时代	定量泵供油量是恒定的，注塑机工作过程中流量和压力的变化是靠流量比例阀和压力比例阀来调节的，所以响应时间相对较快，机器的控制精度和重复精度也相对较高，特别是薄壁注塑产品方面能体现出来。	电热部分：7KW/h 动力部分：18.5KW/h 发热圈表面温度：160~230℃
（第二代）定量泵时代	变量泵的输出功率是随负载的变化而变化。在转速不变的情况下，通过改变注塞泵自身的排量，同时电机负载也会随着排量的变化而变化，达到省电的效果；变量泵的流量是靠改变泵体内的注塞斜板角度来调节的；斜板角的重量较比例阀的阀芯要重的多，所以在响应速度方面会比定量泵系统慢。	电热部分：7KW/h 动力部分：12KW/h 发热圈表面温度：160~230℃
（第三代）伺服时代	将矢量变频技术应用于注塑机电机驱动上，通过速度闭环及压力闭环功能完成对注塑机的精确控制。同步伺服器+同步高效电机的配合有效解决了动力部分的响应速度和控制精度。从而成为了塑机动力标准配置。	电热部分：7KW/h 动力部分：9KW/h 发热圈表面温度：160~230℃
（第四代）ULT伺服时代	在同步伺服系统的基础上，加入能之原纳米红外电热圈，具备节能和超低表面温度(ULT:Ultra-Low-Temperature)两大特性，引领注塑机进入了电热、动力双节能时代。能之原超低表面温度电热圈，可显著降低注塑车间的作业环境温度，从而降低车间的空调能耗，带来二次节能效应。	电热部分：3.5KW/h 动力部分：9KW/h 发热圈表面温度：45~70℃



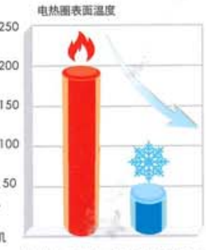
动力耗能对比图



加热耗能对比图



整体耗能对比图



电热圈表面温度对比图

常用电热圈类型对比:

NEZOY能之原

项 目	能之原纳米红外电热圈	普通高频电磁加热	陶瓷加热圈
加热方式	发热体采用纳米合金材料，热转化率高，在通电时只产生热辐射，热量通过红外辐射传导，不产生高频辐射，无紫外线。	将220V/50Hz的交流电整流成直流电.再将直流电转换成频率为20-40KHz的高频电流，高频电流通过线圈会产生高速变化的交变磁场，当磁场内的磁力线通过导磁性金属材料时会在金属体内产生无数的小涡流使金属材料本身自行高速发热。	陶瓷加热圈是用金属做外壳，内有较高绝缘耐火程度的陶瓷内穿上电阻丝，再用机械绞制成型，接通电源即可发热。
安装维护	安装维护简单，可直接替代普通电热圈，也可以与普通电热圈混合使用。	需要加装整流装置，电子元器件多，系统复杂，需要专人维护，维护困难；	通常为一个整体、安装维护不方便。
可靠性	高 产品质保2年，正常使用5年以上	低 易损坏，目前普遍使用寿命在1年内	中 发热体与保温层之间没有隔离保护，使用寿命会
电力影响	直热型，不产生谐波，对电网无影响。	大量的电子整流装置产生谐波，对电网造成谐波污染，对工厂其他精密设备使用造成影响，并且大幅降低其他设备使用寿命，可能出现单机节电，总体不节能的状况。	直热型，不产生谐波，对电网无影响。
成品影响	热惯性小、温控精度高，有效保证成品质量。	温控易失灵，出现异常频率高。在高剪切热系统，温度容易过冲20度以上，影响成品品质。	陶瓷产品热容量大、耐高温。加热升温慢、热导率低延长加热时间，影响产品工艺周期。温控差，易温度过冲。
安全性	红外线测试波长为8-20微米，在医学领域，誉为"生命之光"。	电磁污染已被公认为排在大气污染、水质污染、噪音污染之后的第四大公害	对人体无不良反应
节能率	30-80%	30-70%	基本不节能

能之原纳米红外电热圈测试报告:

项　目	普通加热圈	纳米红外电热圈	对 比
升温时间(min)	60	35	↓ 42%
升温耗能(kwh)	8	4.2	↓ 47.5%
连续半小时静态保温耗能(kwh)	3.5	1.5	↓ 57.2%
工作状态耗能(kwh)	7.5	3.4	↓ 55%
加热圈表面温度(℃)	210	47.5	↓ 77.4%

测试环境说明：海天 HTF300X1
材料：ABS
制品：小家电-热水壶外壳
设定温度：210℃