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Comprehensive Energy-Saving Technology for RTO Flue Gas Waste Heat Utilization

Shuli Liu*

Environmental Technology Group (Qingyun) Limited, Shandong, 253000, China

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ABSTRACT

In the automobile painting workshop, the oven will discharge harmful exhaust gas, the exhaust gas can be reused through the TNV system, the natural gas can meet the emission standard to the atmosphere after burning, and the high temperature gas discharged TNV the system can carry considerable heat. Utilization can effectively improve the economic benefits of the factory. At present, the more mature scheme is to heat the high temperature exhaust gas through the heat exchanger, which can reduce the steam consumption of the factory. Based on the analysis of the comprehensive energy saving content of waste heat utilization of RTO flue gas, this paper hopes to provide some reference and reference for readers.

1. Introduction

High temperature gas discharged from the TNV system of automobile painting workshop can effectively improve the economic benefit of the factory. At present, the more mature scheme is to heat the high temperature exhaust gas through the heat exchanger to reduce the steam consumption in the factory.

2. Research on Mechanism of Regenerative Exhaust Gas Oxidation Device

Generally, the mechanism of comprehensive energy-saving utilization technology of RTO flue gas waste heat is organic waste gas, which is mainly produced in the manufacture of automobile paint spraying room and the operation of various drying equipment. These large amounts of organic waste gas are discharged from pipes[1]. After it is operated and transported to the RTO equipment, it is incinerated at high temperature and recovered and utilized, and the heat energy generated when the exhaust gas is burned by the ceramic heat storage body of the RTO equipment is finally discharged. Generally speaking, the temperature of the gas released into the atmosphere after the use of thermal energy is about 250°C. 1 Considering the safety factors, it is necessary to reduce the flue gas temperature to about 120°C. Before it is discharged As a result, the flue gas temperature has been reduced from 250 to 120°C, and there is still room for recovery. Therefore, aqueous media can be used in this process to maximize thermal energy and convert cold water into hot water to complete flue gas temperature drop and hot water prepa-

**Corresponding Author:*
Shuli Liu,
Male, specialist,
Research direction: research and development of environmental protection equipment and manufacturing research;
Environmental Technology Group (Qingyun) Limited, Dezhou, Shandong, 253000, China;
E-mail: 13910335155@163.com

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ration. The prepared hot water can be transported to every hot water link needed in the automobile manufacturing process, and can also be fully utilized in the hot water boiler.

3. A probe into the Key Points of RTO Waste Heat Control System

RTO flue gas waste heat systems usually include different energy use areas. Therefore, equipment in each energy use field has relatively independent requirements for automation. At the same time, there is an inseparable relationship between production and energy consumption in different regions. Waste heat equipment usually has obvious application advantages in hot water heating and safety protection. Therefore, the relationship between the electrical control cabinets in each area is naturally more complex. Perfect and stable automatic control system is the key premise of safe production of automobile. RTO key points of flue gas waste heat control system usually include the following aspects:

In order to make full use of the RTO flue gas waste heat system, the basic conditions are first adjusted so that the flue gas pipe pneumatic valve is in place and the flue gas passes through the heat exchanger. Instead, it is necessary to ensure that the waterway is still in its original state. By controlling the position of the three-way control valve, water can pass through the waste heat exchanger from beginning to end. In the channel system, the initial setting of the channel valve and the flow of water must be determined during commissioning[2]. To avoid warning when the exhaust temperature is too low, the amount of water is too high, the water temperature is too high or the amount of water is too low. At the same time, in the temperature control of the RTO exhaust heat exchanger, the temperature is controlled in the range of 110 to 120, and the exhaust gas condenses in the heat exchanger, and the long-term corrosion will damage the whole heat exchanger.

When the RTO flue gas waste heat system receives the starting signal of the boiler room pump, the flow information is displayed on the switch of the inlet pipe flow object. The pneumatic valve in the flue gas pipe needs to be automatically converted to make the flue gas always available. It passes through the waste heat exchanger from beginning to end. At the same time, the RTO system needs to respond and operate accurately when receiving relevant information about boiler room pump. The backup signal of the pump ensures that the flue gas pipe can switch the pneumatic valve. When the boiler chamber receives the flue gas pneumatic valve, the forced signal should be switched and the pump should be stopped after 30 minutes. If the smoke temperature is too low and less than 120°C, an alarm signal should be issued. Therefore, the temperature probe must be connected to the inlet and outlet of the exhaust pipe. When the flue gas temperature drops below 120°C, a low temperature alarm is issued to regulate the channel three-way valve, thereby reducing the amount of water in the waste heat exchanger and protecting the RTO system[3].

When low temperature baking technology is used in automobile manufacturing, generally speaking, the RTO exhaust temperature of the paint factory is usually low, so the waste heat of the flue gas can not be comprehensively utilized. When organic waste gas is incinerated or refined through the RTO system, the temperature of the flue gas discharged at this time is usually 30-40 higher than that of the organic waste gas. The oven temperature is usually about 80 ohms for the bumper paint room and the bathroom paint room, but the exhaust gas temperature is usually 110-120 due to RTO refining, this cold flue gas is not very useful. Therefore, the comprehensive energy saving technology RTO flue gas waste heat utilization must fully consider this aspect.

The automatic control system used by the RTO must control the temperature of the flue gas to prevent excessive exhaust temperature of the RTO from damaging the heat exchanger. Since the furnace temperature in the RTO is usually as high as 800 ohms, if the pneumatic switch valve used in the RTO can not switch normally in this state, replace the high temperature gas in the RTO furnace and store it in the heat storage[4]. In this case, the RTO exhaust gas temperature will continue to rise, thereby damaging the heat exchanger. Remember that in RTO settings, the automatic control system should avoid excessive temperature and consider how to control RTO exhaust in case of extreme failure of the whole system.

Automatic air valve switching for flue gas piping must be carried out in accordance with relevant orders. To avoid automatic air valve failure and burn down the drying room. When switching between automatic throttle, make sure the throttle is open so that the unwanted throttle can be closed. As long as the hot air and bypass valves associated with the RTO system are always open, they should always be open.

4. Planning of Exhaust Gas Treatment System for Automobile Painting

In the planning process of automobile painting exhaust gas treatment system, it is necessary to consider reducing the energy consumption rate of the treatment process, re-

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ducing the system investment and operation cost, and reducing the production of automobile painting exhaust gas. According to this plan, the current mainstream automobile painting waste gas treatment system is planned to use automobile painting waste gas for recycling production, manufacturing closed production space, thus reducing the purpose of automobile painting waste gas treatment, At the same time, the heat cycle utilization ratio and energy consumption of automobile painting waste gas treatment are improved[5].

4.1 Waste Gas Recycling Measures in Automotive Painting Workshop

In order to reduce the treatment capacity of automobile painting exhaust gas, the closed space can be used for the production mode of circulating air for automobile painting, but considering the protection and health needs of personnel, it can not be realized. In order to solve this problem, there are two main ways to solve this problem. The first is to send fresh air in the personnel station, and the circulating air is used in other positions without personnel demand. Compared with the original new wind, the pressure of automobile painting exhaust gas treatment has been greatly reduced. Another solution is to improve the intelligent level of robot work, replace human intervention, through machine programming, the robot in the closed workshop to complete the car painting operation, only after the completion of automotive painting waste gas treatment, It reduces the energy consumption level of automobile painting waste gas treatment system and achieves the function of energy saving and emission reduction. Compared with the latter, the first way belongs to the semi-new air conditioning system. The original traditional air conditioning system is a new air conditioning system mode. In terms of energy consumption of air conditioning, the improved air conditioning can also reduce the consumption of cold and hot energy and electric power.

4.2 Heat Recovery and Utilization of Exhaust Gas Treatment System in Automotive Painting and Painting Workshop

The exhaust gas treatment system of automobile painting workshop mainly depends on the method of mixed natural gas combustion after concentration to realize the treatment of toxic and harmful waste gas. The burning exhaust gas will cause air heat pollution and energy waste directly into the atmosphere. The most efficient and feasible way to recycle is to adjust the temperature of the air conditioning system and to heat the fresh air system inside the workshop[6]. Including air conditioning in the flash drying oven after painting the car, its fresh air heating can also use waste gas to burn waste heat.

4.3 Comparison and Comparison of Automobile Painting Exhaust Gas Combustion Device

The volatile organic compounds in the exhaust gas of automobile painting workshop are decomposed into water and carbon dioxide after combustion to achieve harmless treatment. In the application of combustion equipment, there are two main structural forms: RTO and TAR. The latter emission temperature can reach more than 300 degrees Celsius. TAR the emission temperature is low, only about 100 degrees celsius, it needs independent heating device, the economy of its own recycling residual temperature is poor, but it can still carry out hot water preparation, air conditioning heating and other waste heat utilization equipment, plus heat pump system, the temperature difference can be used more, more waste heat resources can be recovered. Because the waste heat utilization system involves the cooperation between many systems, it needs to be considered as a whole in the planning stage, and the reserved space and the water load of the system equipment need to be considered as a whole[7].

4.4 Energy-Saving Planning for Other Automotive Painting Waste Gas Treatment Systems

The biggest problem in the process of indirect utilization of waste heat treated by automobile painting exhaust gas is that it contains more impurities, which is easy to block and attach to the surface of heat exchanger, which results in the decrease of heat transfer coefficient of heat exchanger and can not reach the planning and design conditions. In the face of this kind of problem, the best solution is to use the waste heat inside the painting workshop, especially in the system to prevent pollution related other systems. For example, the waste heat is treated by painting and painting exhaust gas in automobile, which is used for moisture drying and volatile treatment in solid waste, reducing the moisture content of solid waste, reducing the fluidity and volume of solid waste, and increasing the treatment efficiency[8]At present, from the point of view of reducing occupational diseases, many developed countries have gradually used robotic arms to replace manual operations, which can not only achieve a substantial increase in work efficiency, but also reduce human injury and reduce economic investment in personal protection and protection. The unmanned automobile painting workshop can completely use the full circulation air conditioning system, add the equipment such as exhaust gas mixing and

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solid filtration in the circulation process, form a closed workshop and negative pressure control, reduce the pollution to the environment, reduce the waste heat energy consumption of air conditioning fresh air, and reduce the waste gas treatment capacity of automobile painting.

5. Conclusion

To sum up, the waste heat reuse system is a process of boiling water, in which the purpose of the automatic control system is to ensure the safe and stable operation of the waste heat reuse system, that is, the water can not be boiled or dried. First of all, the wind pressure is used to control the speed of the fan to ensure the constant pressure in the air duct. On this basis, the system exhaust temperature is used to control the flow rate of circulating water to ensure that the exhaust temperature is not too low.

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