Energy Storage System in Boiler

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Abstract- so as to explore the waste heat utilization of the boiler tail gas, which may improve the thermal economy of the facility plant and cut back the consumption of the facility fuel, the operation characteristics of furnace gas boiler square measure deeply studied, and also the energy-saving potential of flue gas waste heat of furnace gas tail is excavated. Through the comparison of various flue gas waste heat utilization strategies, the improvement of the tail heating surface is combined with the cascade utilization of waste energy resources,
the analysis of economical flue gas waste heat utilization system is administrated, and also the concrete improvement theme is recommend. It's finished that when matching, it not solely reduces the exhaust temperature of the furnace gas boiler and improves the thermal economy of the unit and also the result of environmental protection, however additionally finally has a very important significance within the increase of station generating capability

I. INTRODUCTION

The general principle of waste heat utilization ought to be supported physics. According to "quality mistreatment energy and cascade utilization", for flue gas at totally different completely different} temperatures and different tastes, the waste heat is recovered and utilised. For high-temperature waste heat and medium temperature waste heat, in sight of its high level of energy, it's typically born-again into best electrical energy through a rotary engine generator. At present, the common ways square measure mistreatment waste heat boiler to recover the waste heat of high-temperature flue gas, applying gas turbines for power recovery, or adopting high-temperature air combustion technology to directly recover medium and high-temperature waste heat (Avagianos et al., 2017). Low-temperature waste heat quality is low, but with the serious energy problem, low-temperature waste heat utilization research is more and more widely. The main waste heat of low-temperature flue gas is heated by air preheater and economizer, which can be used for preheating and drying raw materials or working fluids. At this stage, China's high and medium temperature waste heat utilization technology has reached the international advanced level, and the waste heat utilization technology of low-temperature flue gas is not yet mature, which is still a hot research field at home and abroad.

II. ENGINEERING INTRODUCTION

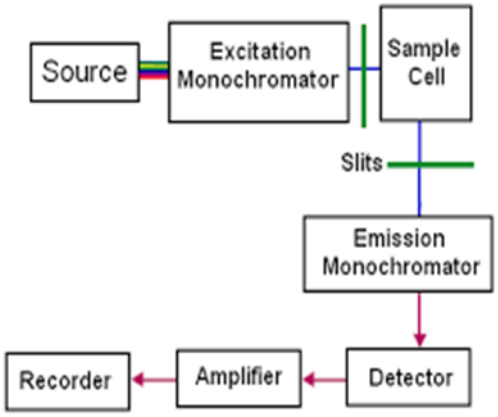
Based on the project, a high-pressure natural circulation boiler for pure blast furnace gas produced by Shanghai boiler works is developed. The boiler adopts a two-stage economizer and single-pole air preheater arrangement and has separate heat pipe gas heater at the same time. The rated evaporation rate of the boiler is 240t/h, the superheated steam parameter is 9.8MPa/540, the boiler thermal efficiency is 89.83%, and the exhaust gas temperature design value is 150 DEG C (Cabral and Mac Dowell, 2017). The steam turbine is C50-8.83/0.981-4 type and 50MW extraction steam turbine. In the rated steam turbine rated output condition, mechanical parameters are p0=8.83MPa and t0=535 DEG C. The exhaust pressure of the steam turbine is A=0.0041MPa. The extraction steam is 130t/h and the pressure is 0.9807MPa. Enthalpy rise of the feed water pump is Δ=15.74/; enthalpy rise of the condensate pump is WASTE HEAT TRANSFORMATION

A. gas waste heat transformation

Because the domestic power plant flue gas waste heat utilization system uses low-temperature economizer

technology after the heat transfer surface is arranged on the air preheater, it limits the heated temperature rise of condensate and condensate extraction point. The action capability of excluded turbine extraction steam power is limited, and the heat utilization rate of the flue gas is only 15%-20% (Darmawan et al., 2017). Therefore, we can learn more from cascade recycling flue gas waste heat method of foreign power plants. A low-temperature economizer is installed in the tail flue, and the condensate flow through the low-pressure heater is reduced Based on the principle of optimal utilization of waste heat, although this scheme increases the heat increase of turbine caused by cold source loss and reduces the turbine efficiency, the heat owned power of Captive Power Plant was improved with the increase of cycle efficiency, the generating capacity of steam turbine increases and the overall economy increases

Figure 1: waste heat utilization system



B. Concrete scheme of optimization transformation

The exhaust gas temperature of the boiler within the case is one hundred fifty DEG C. Through the higher than thermodynamical calculation principle, the condensed water temperature into low economiser shouldn't exceed the temperature of exhaust gas, and also the highest extraction parameters ar restricted. Then, considering the boiler gas, tail flue installation, and different factors, rock bottom outlet temperature of low-temperature economiser is meant to a hundred DEG

C. Thus, 3 schemes are adopted (Friesenhan et al., 2017): theme 1: parallel with No. a pair of unaggressive heater. Partial condensation water is introduced from the doorway of the No. a pair of unaggressive heater, and also the low-temperature economiser is introduced into the heat when interesting and deciding the warmth, and it's connected with the most atmospheric phenomenon water at the outlet of No. a pair of unaggressive heater. At now, the flue gas waste heat will replace some second stage steam extraction.

Scheme2: bike between No.1 and No.2 unaggressive heaters. The shunt valve is organized within the shunt valve is organized within the outlet of No.1 low heater, which may management all or a part of the condensed water into vasoconstrictor economiser. within the in the meantime, we tend to set the pressure of millet and come back the atmospheric phenomenon water having absorbed sure heat to the thermal system, and meet with the most atmospheric phenomenon water at the doorway of No.2 low- pressure heater (Oluleye et al., 2016). At now, flue gas waste heat will replace some second stage steam extraction.

Scheme 3: cross stage parallel reference to No.2 and No.3 low power heaters. From the water of No. a pair of low heater, the condensed water is amused and a few condensed water enters into the vasoconstrictor economiser (Santhanam et al., 2016). When interesting a definite quantityof warmth, it returns to the regenerative system and joins the most condensed water part at the outlet of No.3 unaggressive heater. At now, flue gas waste heat will replace some second and third stage steam extraction.

Scheme2: cycle between No.1 and No.2 unaggressive heaters. The shunt valve is organized within the shunt valve is organized within the outlet of No.1 depression heater, which might management all or a part of the condensed water into vasoconstrictor economiser. within the in the meantime, we have a tendency to set the pressure of millet and come the atmospheric phenomenon water having absorbed sure heat to the thermal system, and meet with the most atmospheric phenomenon water at the doorway of No.2 low- pressure heater (Oluleye et al., 2016). At now, flue gas waste heat will replace some second stage steam extraction.

Scheme 3: cross stage parallel reference to No.2 and No.3 low power heaters. From the body of water of No. two depression heater, the condensed water is pleased and a few condensed water enters into the vasoconstrictor economiser (Santhanam et al., 2016). Once gripping a definite quantity of warmth, it returns to the regenerative system and joins the most condensed water part at the outlet of No.3 unaggressive heater. At now, flue gas waste heat will replace some second and third stage steam extraction.

CONCLUSION

It can be seen that, the high efficiency flue gas waste heat utilization system with low temperature economizer is adopted in the project, and the three schemes are feasible transformations. The unit efficiency can be increased in engineering thermodynamics, heat transfer and fluid mechanics, without affecting the operation safety and reliability, for the heat transfer temperature, pipe resistance, small number of low pressure heater, not high temperature of condensed water into low temperature economizer and so on effects, the extraction cross level parallel has the simplest energy-saving thermal economic benefits, and therefore the cross level parallel is that the optimal scheme.

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