CASE STUDY

Retrofit of ESP with RDE & HFTR

Application

130 T/H coal fired boiler ESP of a paper factory located in Shanghai, China

Problem

To conform with the new emission standard (GB13223-2011) of air pollutants of thermal power plants, the emission limits of coal / oil / gas fired boilers of 65 T/H and above must be controlled below 20 mg/m^3.

Loose and bent DE's were found, leading to sparks and arcs during operation resulting to low current and voltage leading to high dust emission of more than 30 mg/m^3.

Solution

The first two fields of the ESP were retrofitted with rigid discharge electrode (RDE) which is stronger and reliable than the old square wire DE. It has low corona onset voltage, thereby increasing the dust collecting efficiency.

The conventional transformer was also changed to high frequency transformer which also helped reduce the emission rate to meet the standards.

Upgrade of DE to RDE- The new type RDE has more aggressive emitting

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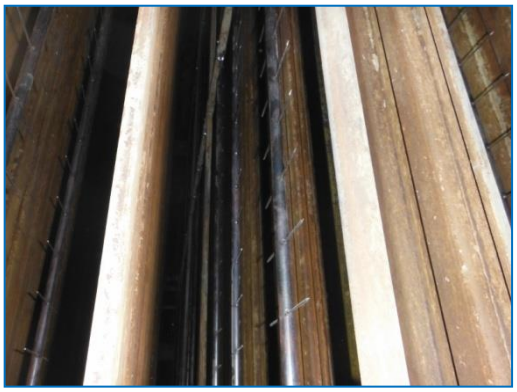
characteristics as compared to the old square wire DE. It is stronger than the old DE. Also, lesser quantity of new DE is required to attain the same results.


Old type Square Wire DE


New Type RDE

Upgrade of the power supply system to the High Frequency Transformer- The high frequency transformer requires less KVA input and higher power factor compared with the conventional transformer. Its faster response to sparking and arcing can lead to higher average readings making them as close to the peak values. With more power going into the ESP, efficiency increases. The smaller size of high frequency transformer with lesser oil and built-in DSP based controller make it easier to maintain as well.


Conventional Transformer


High Frequency Transformer

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Benefits

Increase in the entire ESP efficiency by 25%

Average Outlet emission before the retrofit* : 32.8 mg/m3

Average Outlet emission after the retrofit** : 16.6 mg/m3

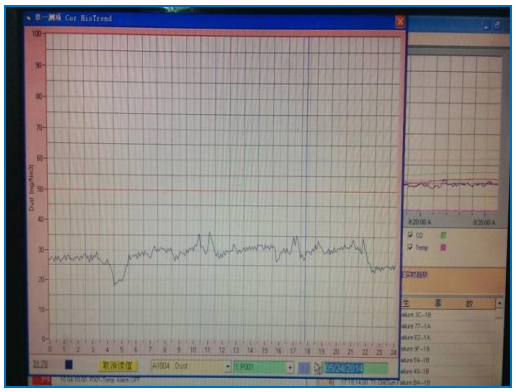
The average outlet emission has improved by 49.4%

**Emission test before retrofit was carried out four times (within one year)*

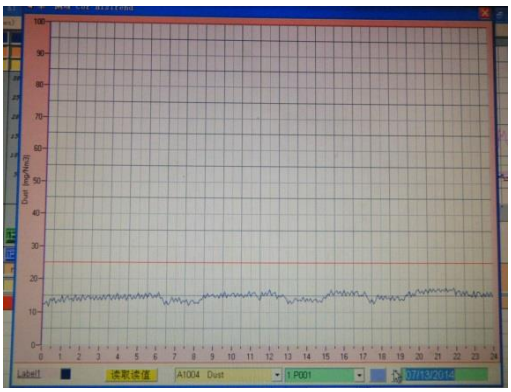
***Emission test after retrofit was carried out three times (within three months after operation)*

Electrical readings before retrofit : 52.5kV/228mA

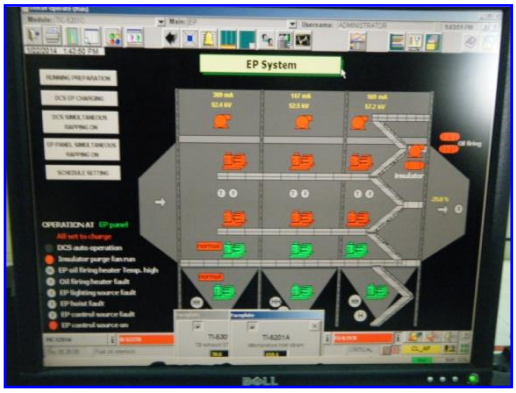
Electrical readings after retrofit : 53.3kV/852.5mA



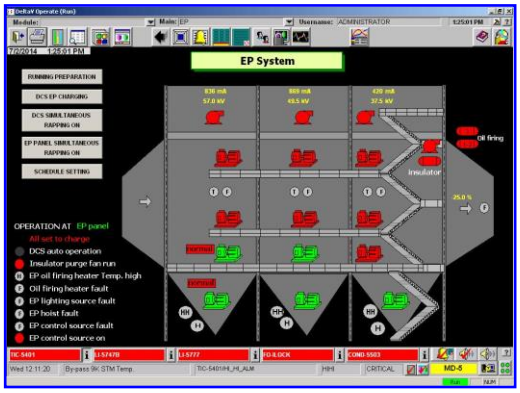
Average Emission Rate (Before)- 32.8mg/m^3



Average Emission Rate (After)- 16.6mg/m^3



Operating Values- Before



Operating Values- After

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	First Field	Second Field
Before Retrofit	52.4 kV / 309 mA	52.5 kV / 147 mA
After Retrofit	57 kV / 836 mA	49.5 kV / 869 mA

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