



CASE STUDY

ESP Performance Enhancement via RDE and PowerPlus Upgrade at Coal-fired Boiler ESP

Application

550MWx10 Coal-fired Boiler ESP of Power Plant in Taiwan

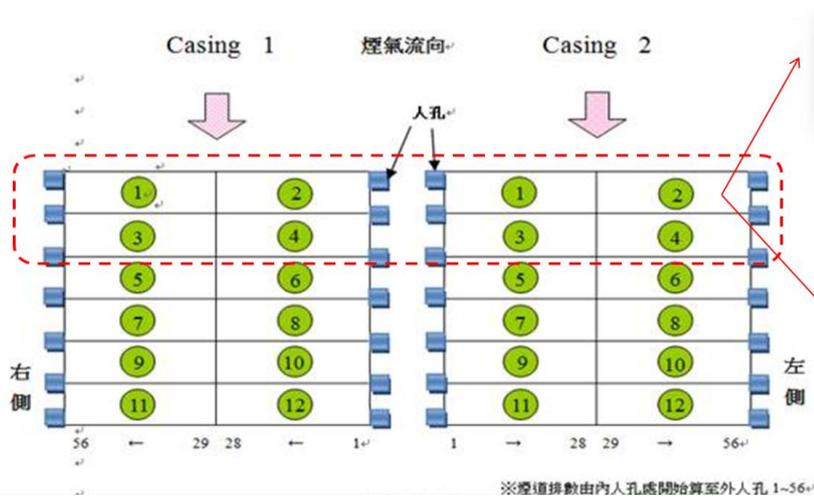
Problem

The ESP has been operated for almost 20 years. The ESP became underperformed due to aging factor with decreased reliability of internal parts. As the result, customer was encouraged to take action towards ESP performance improvement. The government regulation in Taiwan requires emission to be below 28 mg/Nm³. However, customer expected to lower down emission to be below 15 mg/Nm³

Solution

Tai & Chyun helped with data analysis and came up with the ESP upgrade solution. There are 6 mechanical fields in each chamber with 4 conventional transformers in each chamber, where RDE and PowerPlus is recommended to be installed at the 1st and 2nd field in all four chambers. Therefore, 8 pcs of 83kV, 1445mA PowerPlus and 16,128 pcs of RDE were installed in total.

Accordingly, Tai & Chyun delivered the supply parts with short lead time to meet customer shutdown period, while the project execution was finished within 1 month.



RDE



PowerPlus

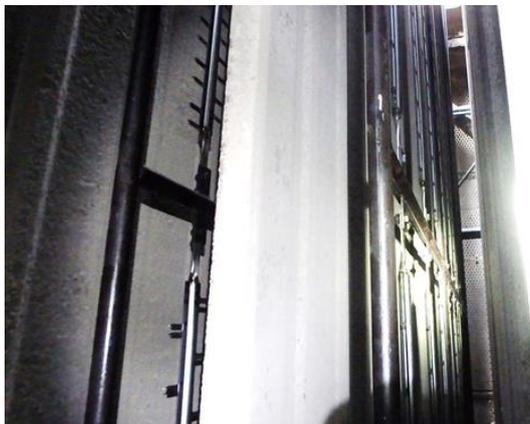
Location of ESP Upgrade



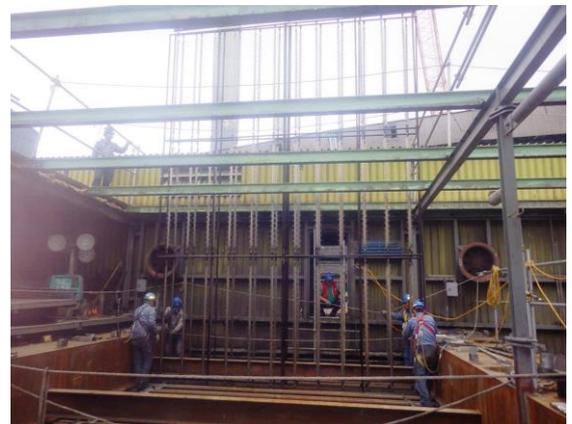
Original DEs and its frame



Supplied RDE



New RDEs and its frame



Installing RDE and its frame



Installing PowerPlus



Installed Controller

Benefit

By upgrading the ESP with RDE and PowerPlus in the upstream fields, where there is a high dust concentration and the fine particle must be charged as quickly as possible, ESP dust collecting efficiency can be enhanced and emission can be reduced.

RDE can provide uniform and aggressive corona current density on the surface of the collecting plate. Moreover, with better geometry and configuration, RDE can also increase migration velocity, allowing for better collecting efficiency.



The application of PowerPlus can help to decrease kVA for the same amount of power applied to the field, offering faster spark response with less wasted spark current. It also has significantly higher power factor (0.94), when compared to a conventional T/R (0.63). PowerPlus circuit can turn on and off over 250 times faster than the conventional one, allowing much faster control response and better intermittent energization control.

The plant's emission before upgrade was at 19.38 mg/Nm³. After installing RDE and PowerPlus, the average emission was reduced successfully to 10.98 mg/Nm³, indicating that the emission was improved at almost 43%.

	Dust concentration (mg/Nm ³)
<u>Before</u> Retrofit	19.38
<u>After</u> Retrofit	10.98
Improvement	43%

Reduction of Dust Concentration after ESP Upgrade