

PowerPlus Tech Note #302

Rapper Control and PowerPlus™

INTRODUCTION

The purpose of the rapper system on an electrostatic precipitator (ESP) is to remove the collected particulate from the plates and electrodes. This is done by imparting a mechanical force to the plates and electrodes to dislodge the particulate and allow it to fall into the hopper to be later removed by the ash handling system.

The critical variables to the rapper system are the amount of force imparted to remove the particulates without causing re-entrainment into the gas stream, and the frequency with which this force is used. Optimizing these two factors will vary based on the ESP design and the flue gas characteristics. The dimensions of the collecting plates, the dust resistivity, cohesiveness, and collection rate all effect the rapper timing and force.

Rapper timing should allow agglomeration of collected dust layers to into a uniform sheet so that it will drop into the hopper when rapped and minimize re-entrainment. Rapping too often prevents formation of this uniform sheet, causing more re-entrainment. Not rapping often enough will result in a thick layer of insulating dust on the plates, causing the power levels within the field to decrease.

Since the inlet field of an ESP collects the highest amount of dust, the time required for the collected dust to agglomerate will be shorter than that for the second field, which collects less dust, and likewise for the next field. This is why the rapping cycle times are longer as the flue gas progresses from the inlet to the outlet of the ESP.

IMPACT OF POWERPLUS ON RAPPING

Switching from linear T/R sets to PowerPlus will affect rapping timing. The reduced ripple output will increase the average voltage to the fields. This will in turn increase the migration velocity, the mADC, and the input power for that section. This will result in more dust collection, reducing the time required for uniform sheet formation.

If no changes are made to the rapper timing, the dust layer will get too thick and reduce power to the fields, thereby reducing the collection efficiency. Increasing the rapping frequency should solve this problem. Rapper optimization is a very slow process. It will take substantial time to see the effect of any changes to your rapping program. It is suggested that you start with optimization of the inlet fields first, and then move on to the next sequential field until the outlet is reached.

