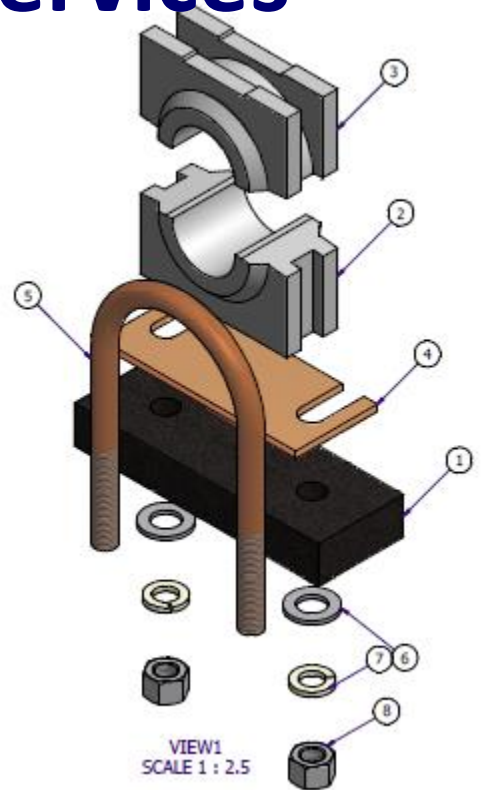
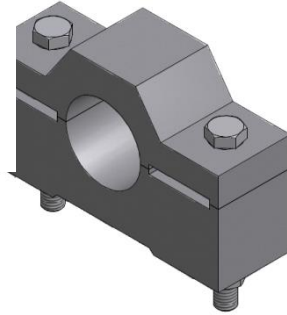


# Electrostatic Precipitator Parts and Services



RHAJTEK not just make the equipment- we provide products/services that make the equipment operate **better**

## Products

- New ESP units
- Automatic voltage controls
- Precipitator control software
- High voltage support insulators
- Collecting plates
- Discharge electrodes
- Tumbling hammer systems
- T/R sets
- Rapper shaft insulators
- Pillow (plain) block bearings
- SCR (Thyristors)
- CLR – Current Limiting Reactor
- Diodes
- Anvils
- Rapping bars
- Electric Heaters
- Control Cabinets
- OEM Replacement parts for the following:
  - a. Flakt/ABB/Alstom style
  - b. Lurgi/MHI style
  - c. Research/Korea Cottrell style
  - d. FLS style
  - e. Elex style
  - f. KHD style
  - g. Walther CIE style
  - h. Hitachi style
  - i. and several others

## Services

- Electrostatic Precipitator Inspection
- Repair of Mechanical Components
- Servicing and Maintenance of Internal Components
- Electrical works such as controller upgrades and TR set servicing
- Gas Distribution Study
- Upgrades both mechanical and electrical

We provide replacement parts for all types of Electrostatic Precipitator

## ELECTROSTATIC PRECIPITATOR

Performance of the electrostatic precipitator depends on three factors that affect it. These are the process, the mechanical and the electrical factors.

As the regulation for the environment become stricter, all plants that use electrostatic precipitator need to comply with this otherwise they will left behind and tendency of shutting down the plant unless they comply with the regulations.

Complying with the stricter regulation does not come easy. Since this incur capital to implement the modification or upgrades necessary for the electrostatic precipitator to perform as expected.

Some plant tends to change the process by increasing the capacity, changing the fuel type, change of products, etc. With this changes, the electrostatic precipitators simply can't handle this that it tends to perform below the expected performance.

In order to improve the electrostatic precipitator, there are needs to evaluate the equipment based on these three factors. And implement what are the improvements necessary to comply with the regulations.

## PROCESS OPTIMIZATION EVALUATION

Process changes affect the performance of the electrostatic precipitator. These changes can impair the level of efficiency the ESP can perform. These changes could be of the following:

- Changes in fuel type i.e. coal with high sulfur content, with low sulfur content, use of alternative fuel, etc.
- Increase in production capacity thus increasing the amount of flue gas on the system
- High fly ash conversion of the fuel
- Equipment modification i.e. boiler modification, SCR installation, etc.
- Increase dust resistivity due to change in temperature.
- Increase flue gas capacity thus lowering the SCA (specific collecting area) ratio of the ESP.

Evaluation of the existing electrostatic precipitator based on the process changes is important in analyzing the capability of the equipment. These will also dictates the proper size of the ESP needed to comply with the regulations.

## MECHANICAL OPTIMIZATION EVALUATION

Mechanical aspect of the electrostatic precipitator plays an important role on the performance of the unit. Mechanical parts of the ESP deteriorate over the period time thus causing low performance of the ESP. There are also several factors that affect the mechanical components of the ESP that leads to poor performance. These are the following:

- Thermal expansion of the internals
- Gas distribution of the flue gas across the precipitator
- Bending or bowing of collecting plates and discharge electrodes causing close clearance problem.
- Poor material selection.
- Inefficient cleaning mechanism
- ESP size not enough for the requirement
- Increase gas flow due to increase in capacity reduces the size of the precipitator.

In order for the Electrostatic precipitator to perform efficiently, there are needs to maintain the integrity or the soundness of the mechanical components. But first, there is a need to evaluate the unit whether the size is enough to handle the process inputs as well as the required outlet emission. With this, it is easier to analyze whether the ESP can handle the load or not. If the ESP units are sized properly, then poor performance could be due to the mechanical problems. This can be analyze based on the information as well electrical inputs to be provided by the plant and the actual inspection to be done on site during outage.

## **ELECTRICAL OPTIMIZATION EVALUATION**

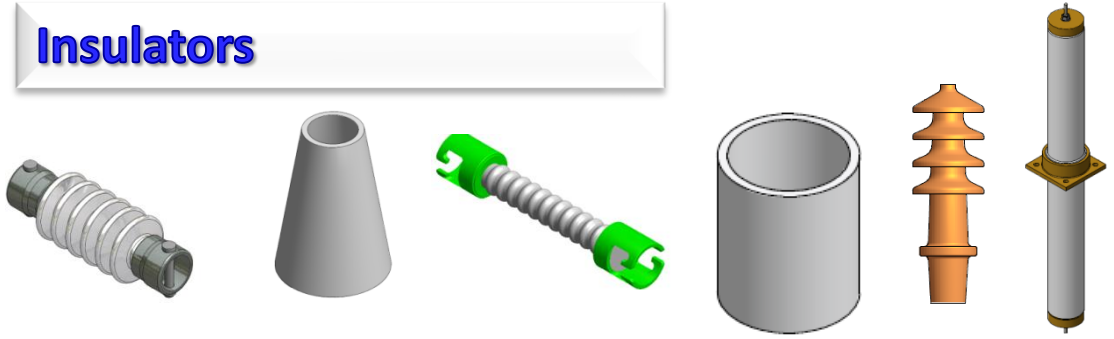
Over the years, developments of new technology for the automatic voltage controllers are continuously revolving. State of the art controllers are now being developed to further improve the collection efficiency of the electrostatic precipitators. Old controllers do not have the features that the new controllers have today. Improvements on the controls can further develop or improve for better collection of the electrostatic precipitator without any changes on the mechanical side of the precipitator even with the changes made on the process side.

## **ELECTROSTATIC PRECIPITATOR PERFORMANCE OPTIMIZATION**

Considering all the factors specified above, performance of the precipitator could be improved based on the inputs on all the aspects indicated above. Summarizing this information will be of great help in determining the best possible solution for the electrostatic precipitator improvements.

RHAJTEK INDUSTRIAL SYSTEM provides the solutions for all aspects of the electrostatic precipitators, perform the evaluation of the electrostatic precipitator based on the process, mechanical and electrical aspects that affect the performance of the electrostatic precipitator and performs upgrade of existing units that will increase the performance and reliability of the equipment

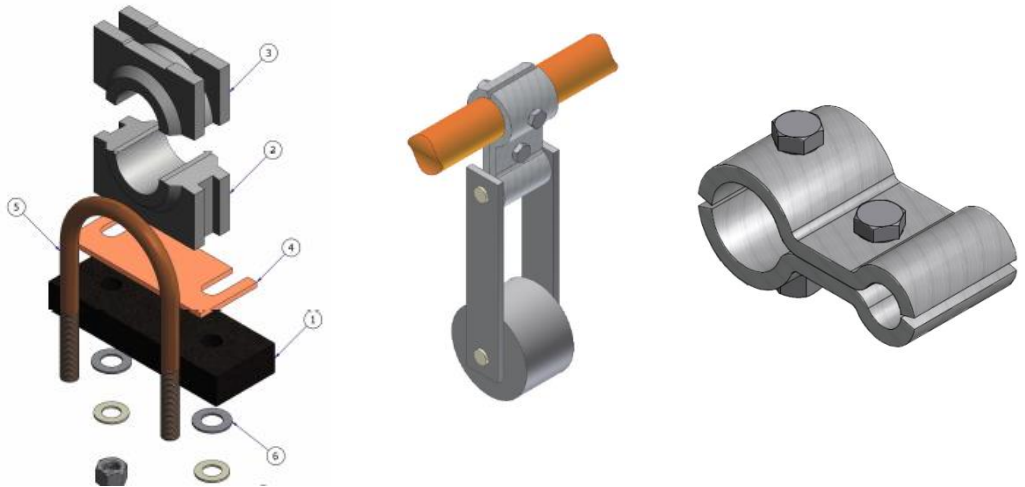
## Insulators



Insulators are used in numerous locations in the Electrostatic Precipitator high voltage system. Common types of insulators and usage include support insulators which support and isolate the discharge electrode system, standoff, post and through bushing insulators to support and isolate the high voltage bus, insulated rapping rods to transmit rapping energy to and isolate the high voltage discharge electrode frames and anti-sway insulators to prevent movement of the discharge electrode frames.

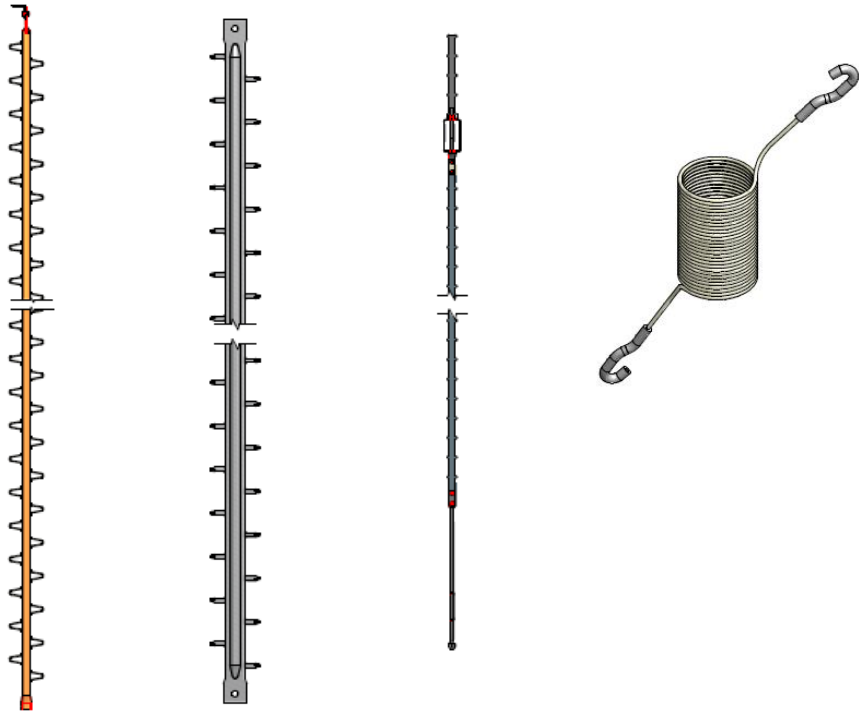
Materials for each insulator varies from porcelain, ceramics and Alumina.

## Tumbling Hammers



We provide replacement parts for all types of Electrostatic Precipitator

## Discharge Electrodes



## Collecting Plates





## Technical Services

### Gas Flow Distribution Study

Gas Flow Distribution is very important as it significantly affect performance of the electrostatic precipitator. Oftentimes, this issue or problem are being neglected in the plant and concentrate more on troubleshooting other issues/problems.

If gas flow distribution across the precipitator is a problem, it cause lower than predicted collection efficiency of the precipitator even though all internal components are still in good physical conditions.

### Problems Associated with Poor Gas Distribution

- Lower than predicted collection efficiency of the precipitator
- Excessive sweepage or re-entrainment of dust in the precipitator
- Excessive sparking on the low velocity zone
- Dust falling out plugging the distribution device
- Inlet distribution devices are already worn out and holes are not the sizes as it was during original installation
- Some of the corrective plates were worn out or fall off
- Deformed inlet distribution devices
- Build up on the distribution device

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## Impact of Poor Gas Distribution

- The improved collection efficiency on the low velocity zone does not offset the degraded performance on the high velocity zone
- Dust build up occur in low velocity zone thus creating excessive sparking

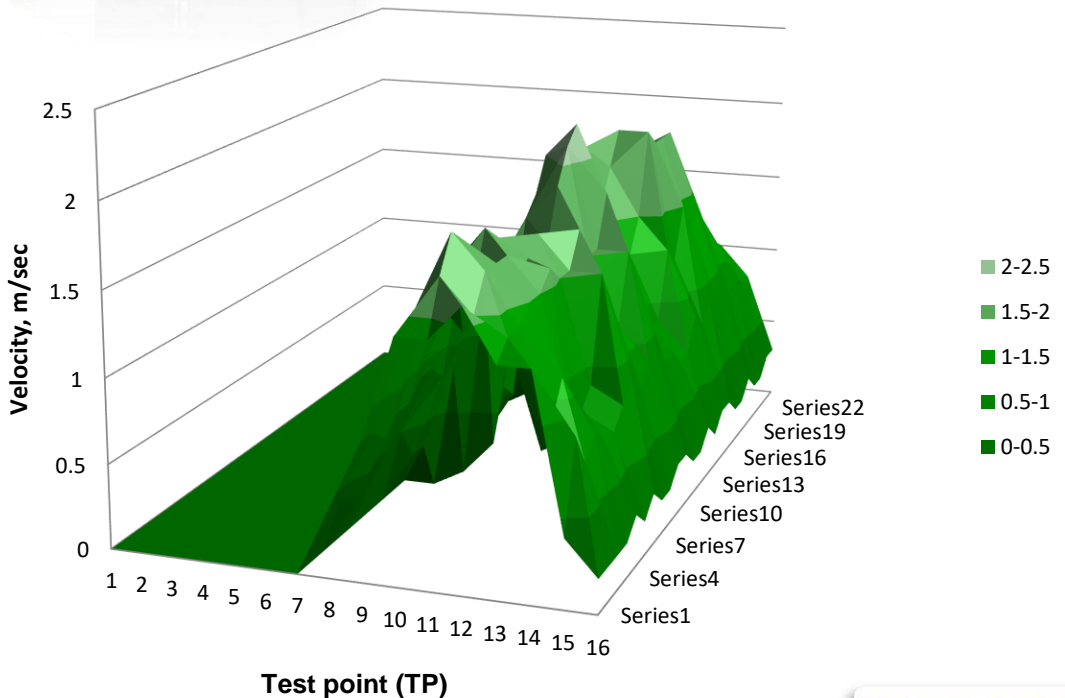
## Objective

The objective of the Gas Distribution Flow study is to identify actual gas flow distribution across the precipitator and to achieve acceptable uniformity at the minimum pressure drop during correction

## Actual Gas Distribution Flow Study

Gas distribution flow profile shown on below graph is an actual measurement done in one of the cement plant that show uneven gas distribution across the precipitator. Graph shows flow of gas on top is minimal as compared to the bottom area. Corrections were made after the measurement and there was a significant improvement on the collection efficiency after the corrections.

## Gas Distribution Profile





## Transformer/Rectifiers (T/R) Inspection & Maintenance

- Transformer/Rectifier basics
- Transformer, Rectifier
- Choke coil
- Inspection & maintenance
- Gauges
- Fluids
- Megger tests, bushings and connections
- Switches
- Maintenance log
- Dissolve Gas Analysis
- Perform leak and pressure test.
- Perform Megger/Insulation Resistance test. Record P.I (Polarization Index) between phases and ground.
- Perform open-circuit/ core loss test on all phases.



## Repair Works and Servicing

### Electrostatic Precipitator Repair and Maintenance



RHAJTEK highly trained service crew provides services for Electrostatic Precipitator repair, maintenance, upgrades and new installation.

Our maintenance program includes preventive maintenance, repair and an annual service contract to maintained all Electrostatic Precipitator unit and aim to minimize cost of our customers in terms of unexpected shutdown and replacement of internal components.

**RHAJTEK®**

GENERAL CONSTRUCTION  
DUST COLLECTORS  
WET SCRUBBERS  
MATERIALS HANDLING  
PROCESS EQUIPMENT  
ELECTRICALS

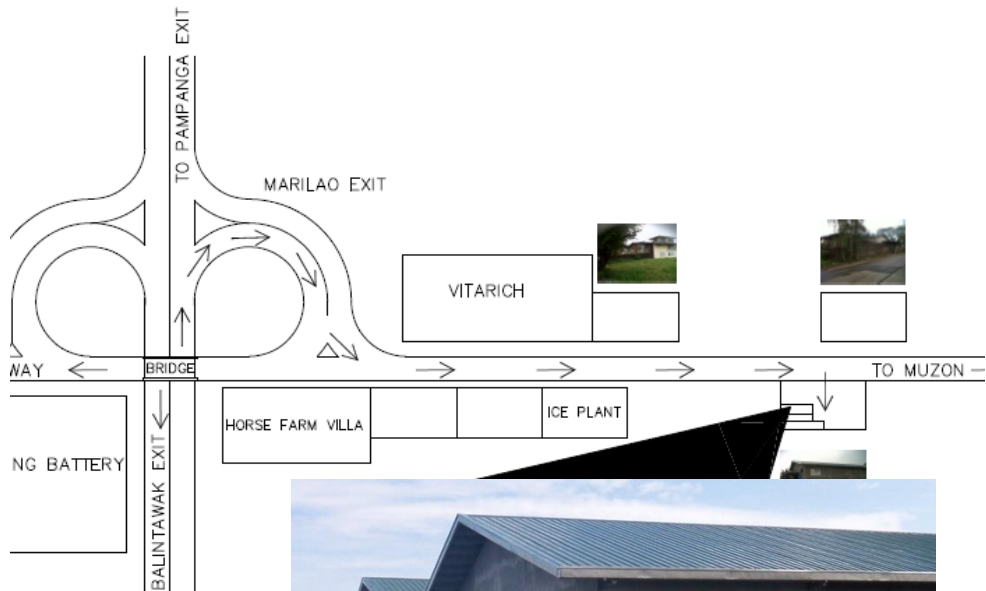
**INDUSTRIAL SYSTEMS  
AND CONSTRUCTION  
INCORPORATED**

DESIGNERS    FABRICATORS    SUPPLIERS

DESIGNERS    FABRICATORS    SUPPLIERS

ELECTRICALS

## Your air pollution control specialist



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