

IMPACT OF VELOCITY ON SCALING AND PARTICLE CAPTURING

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***Abstract-** This presentation will focus on the role of fluid flow in scale formation in the Bayer plant (aluminium refinery) and in capturing particles in the Electrostatic Precipitator (ESP) in a power plant and discuss problems associated with these processes.*

Scale growth in alumina refineries is a common phenomenon and it occurs where supersaturated solutions are in contact with solid surfaces. It leads to serious on-going technical problems and is a major cause of production loss and high operational cost due to equipment downtime required for cleaning and rescaling operations. Several factors and parameters such as the composition of the ore, the saturation level of caustic solution, the rheological properties, the process equipment, the velocity and turbulence of suspended and fluid particles, the particle size and shape and adhesive property of particles, contribute to scale formation and deposition. Most of the above parameters are related to fluid dynamics characteristics, namely fluid velocity and they play a critical role in scale formation.

Electrostatic Precipitators (ESP) are the most reliable emission control devices that are used in coal fired power plants to capture fine particles. Before being released into the environment, flue gas flows through the ESP where particles are collected. The ESP is used as a cleaning device. A rectangular collection chamber which is known as the inlet evase and an outlet convergent duct known as the outlet evase are the key components of an ESP. For flow distribution, perforated plates are placed inside the inlet and outlet evase and for separating the dust particles from the flue gas, an electrical field is created in the ESP. Capturing very finer particles remains a challenge.

Both the scaling in the Bayer plant and particle capturing process in the ESP are strongly affected by fluid velocity. The underlying mechanism of these processes are examined in this presentation with a view to improving equipment and plant efficiency.