

# FLUE GAS PATH ANALYSIS IN ESP INLET & OUTLET DUCTS

VERTICAL:  
**POWER & NUCLEAR ENERGY**

SERVICE:  
**ENGINEERING SERVICES**

TECHNOLOGY:  
**CFD**

Our customer from power sector is a major manufacturer of ESPs for thermal power plant flue gas treatment. They were engaged in commissioning their ESP in parallel to two small capacity ESPs previously existing in their client’s plant. The corresponding ducting layout from APH to ID Fan is to be so designed that 30% flow enters the old ESPs each and 40% gets diverted to new ESP. The flow diversion is built upon the pressure drop emerging from various branches & cannot be trivially estimated (using empirical correlations) due to presence of multiple junctions & numerous non standard bends.

Zeus Numerix carried out CFD simulations of flue gas path, as it can accurately calculate the pressure drop across 3D ducting layout as well as flow rate of flue gas through each ESP branch. The proprietary CFD software, CFDExpert-Lite™, was employed for this simulation, wherein, incompressible flow was solved over 100% hexahedral mesh. The ESPs were modeled as porous media zone with porosity coefficients derived & calibrated from their respective design data.

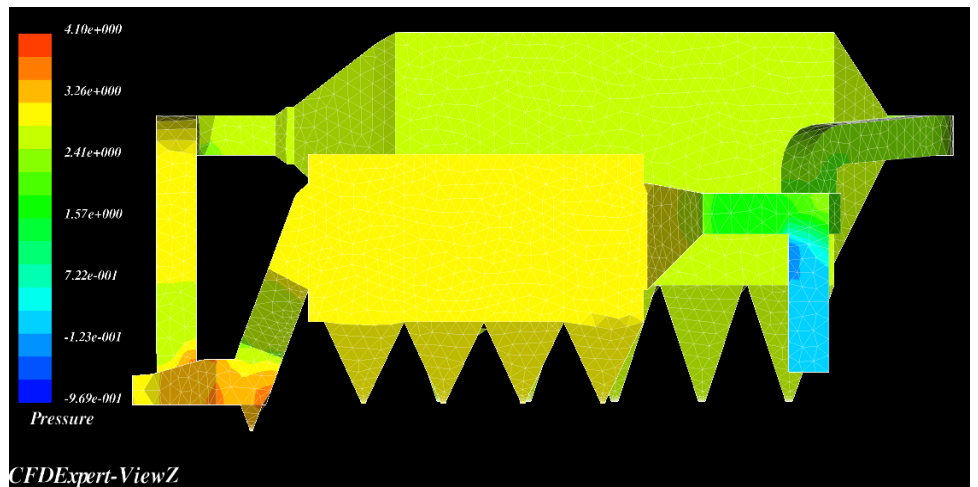
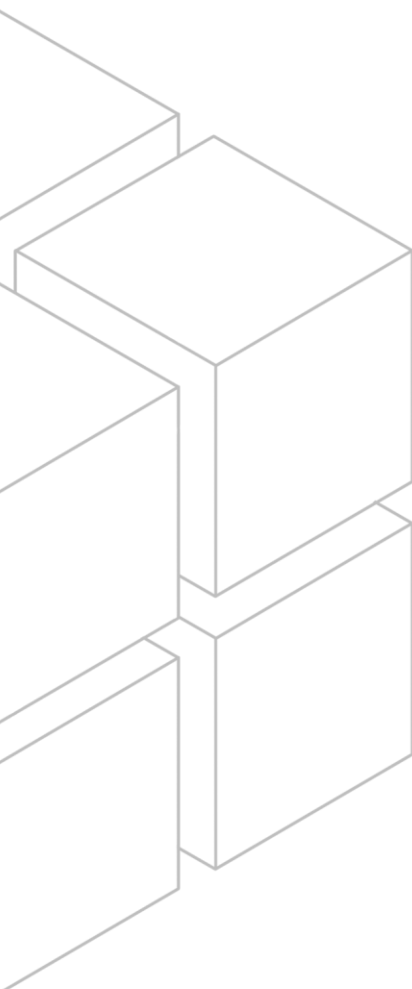


Figure 45: Pressure variation on the ESP surface

Customer was provided with a detailed breakup of pressure drop values & their sources in the ducting layout. A damper was recommended for obtain the desired flow rate through ESPs. Pressure drop requirements from this damper were delivered to customer, which were used for its design & fabrication. Using CFD study as analysis tool, customer saved precious time & cost on expensive design modifications that would have been required after post commissioning.