

**IMPROVEMENT OF THE DESIGN OF ELECTROMAGNETIC PLUNGER FOR
NANOPARTICLES ELECTROSTATIC PRECIPITATOR (ESP)**

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ABSTRACT

One of the problems with nanoparticles using electrostatic precipitator technique is that they tend to adhere to the electrodes (plates). Work in the past made use of electromagnetic plunger to knock off the particles from the plate. However the collection efficiency was poor. This work focuses on a new method of removing the particles from the plate. A plunger made to be in concentric with coil can be made to move reciprocating. A brush is attached to the plunger so it can scratch away the particles left on the plates. With higher no. of turns, the forces can be made greater (1000 turns to 1500 turns). Two different types of plunger have been uses in this experiment such as copper and iron. The results are discussed based on the voltage supplied to the solenoid, different types of plates and times repetition of moving plunger in order to get the nanoparticles size in electrostatic precipitator process (ESP). The results showed that the proposed technique can be considered as one of the method to obtain nanoparticles.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The air pollution has become worsen in recent years. One of the causes is due to the particulate emissions of nanoparticles from many big industrial units, such as power generation stations utilizing solid fuels, the cement and mining installations, the petroleum and chemical industries[1]. Consequently, the numbers of peoples are exposed to the nonaparticles may increase markedly in the future. The medical institution indicate that peoples who are expose to nanoparticles may cause pulmonary disease, cardiovascular health effects and immune system impairment[2]. Through devices such as the electrostatic precipitator, electrical engineers can protect the environment from harm and fight against pollution. Therefore this project is implementing electrostatic precipitator as another method to capture nanoparticles. The electrostatic precipitators are widely used to control the particulate emissions and there are no doubts that electrostatic effects can play a prominent role in filtration and the importance of these effects has been emphasized[3]. Their cleaning efficiency may vary between 90% and 99% depending on the specific application and operating conditions[4, 5]. The optimization of the cleaning efficiency of electrostatic precipitators is important in a wide range of industrial applications[6]. One of the researches that have been done to capture the nanoparticles size is by using electromagnetic plunger in Electrostatic Precipitator (ESP) process[7], this technique can be employ as a method for classification particles. A feasibility study