

## **ABSTRACT**

### **THE EFFECTS OF PHYSICALLY ACTIVATED AND CHEMICALLY ACTIVATED FLY ASH ADSORBENT WITH MASS VARIATION AND NORMALITY ON ENGINE PERFORMANCE AND EXHAUST GAS EMISSIONS OF A 4-STROKE MOTORCYCLE**

by

**MARIO**

Power plants that used coal as raw material in combustion process are producing waste that can contaminate environment, one of them is fly ash. Indonesia government law's no 18 and 85 of year 1999, classified fly ash as toxic and hazardous waste. One of effective way to re-use fly ash is to use it as adsorbent.

This research was used some variations of test, that were road test with constant velocity at 50 km/hr in 5 km distance, acceleration test from 0-80 km/hr, stationer test at 1000, 3000, and 5000 rpm, and exhaust gas emission test at 1500 and 3500 rpm. The purpose of this research was to know the effects of physically and chemically activated fly ash adsorbent on engine performance and exhaust gas emission of 4-stroke motorcycle. Composition that used in this research are 64% fly ash, 32% water and 4% tapioca, with mass variation and normality. Activation was done at 150<sup>0</sup>C temperature for 1 hour.

Fly ash pellets in this research had 10 mm diameter and 3 mm thick, packed in a frame and formed as the air filter of the motorcycle test. On road test, the highest consumption reduction, obtained from fly ash pellets 0,25N mass 30 gram was 22,381%. In stationer test, it occurred in using pellets 0,25N mass 30 gram at 5000 rpm with consumption reduction 27,586%. Where as in acceleration test, it was obtained from pellet physically activated mass 20 gram with acceleration rise 7,145%. Meanwhile in exhaust gas emission test, the highest reduction of CO and HC occurred in using pellets physically activated mass 30 gram, with reduction 28,333% and 30,883%. And highest increase of CO<sub>2</sub> was obtained from pellets 0,75N mass 30 gram was 6,061%.

Keywords : Coal, fly ash, adsorbent, activation, exhaust gas emission