

ABSTRAC

THE EFFECT OF GRAPHITE ADDITION AGAINTS WEAR RESISTANCE OF COAL/PHENOLIC FLY ASH COMPOSITES

by :

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Fly ash is the waste products of coal combustion process that increasing every year and it can pollute the environment. Waste fly ash can be used as composite materials for brake canvas. Graphite is a carbon modification which consists of carbon atoms that works to increase the wear resistance and it can affect the coefficient of friction on the brake canvas. The research objective is to determine the effect of the addition of graphite againts the wear resistance of coal/phenolic fly ash composite and identify the failures in composite with SEM photograph testing.

Composites that are used is the particle type with ratio of 60% phenolic resin as a matrix, BaSO₄ 10% as fillers, fly ash 25%, 20%, 15% as an amplifier, and graphite 5%, 10%, 15% as a friction modifier. The manufacture of the specimen is done by mixing the composite material for 20 minutes then mold it and then heating it with temperature of 250°C and given it pressure of 5 tons for 40 minutes then heated it using the furnace for 4 hours at a temperature of 150°C. The testing of the specimen using the wear resistance testing and SEM photos (scanning electron microscope).

The results of testing wear resistance on the upper surface of the specimen obtained an average yield of 5% graphite is $1,86 \times 10^{-6} \text{mm}^3/\text{mm}$, 10% graphite is $1.22 \times 10^{-6} \text{mm}^3/\text{mm}$ and 15% graphite is $1.51 \times 10^{-6} \text{mm}^3/\text{mm}$. Wear resistance testing on the bottom surface of the specimen obtained an average yield of 5% graphite is $1,86 \times 10^{-6} \text{mm}^3/\text{mm}$, 10% graphite is $1.34 \times 10^{-6} \text{mm}^3/\text{mm}$ and 15% graphite is $1.88 \times 10^{-6} \text{mm}^3/\text{mm}$. The content of 10% graphite is the most optimal composition for the lowest values of abrasion and the distribution of the particles be spread evenly so as to with stand the wear rate well. SEM observation of specimens with the highest value of wear and tear on the content of 10% graphite as the upper distribution graphite powder and phenolic as a binder that is less evenly in fly ash resulted specimens are not so strong to with stand the abrasion of the wear resistance test. SEM observation of specimens with the lowest value of wear and tear on content of the 10% graphite as the upper distribution graphite powder and phenolic as a binder that is more evenly in fly ash so that the abrasion happens to the the wear test is smaller than the other specimens.

Keywords: Composite Particles, Graphite, wear resistance, SEM photos.