CHAPTER V

CONCLUSIONS AND SUGGESTIONS

This chapter reviews overall conclusions which can be made based on the analysis of finding shown in previous chapter.

5.1 Conclusion

The following conclusions are drawn from this study:

a) The most significant factor that influence the hardness characteristic of Al-Cu-SiC_p MMC is weight percentage of SiC. Other significant factors are stirring time and particle sizes of SiC. $A_1B_2C_0D_0$ is determined as optimum condition factors for the maximum hardness (A_1=59μm SiC, B_2= 15% SiC, C_0 = 675 ^{0}C and D_0 = 5 minutes stirring time). Optimum hardness is 82.5 HV.

b) Weight percentage of SiC is the most significant factor that influenced the wear resistance characteristic of Al-Cu-SiC_p MMC. Other significant factors include pouring temperature and particle size of SiC. $A_2B_2C_2D_0$ is the optimum condition for the minimum wear rate (A_2=106 μm SiC, B_2= 15% SiC, C_2 = 725 ^{0}C pouring temperature and D_0 = 5 minutes time of stirring). Wear rate at optimum condition was 1.585 x 10^{-5} g/sec.

c) Particle sizes of SiC is the most significant factor that influence the compressive strength of Al-Cu-SiC_p MMC. Other significant factors include weight percentage of SiC, pouring temperature and stirring time. Optimum condition factors for highest compressive strength is $A_1B_2C_2D_1$ (A_1 = 59μm SiC, B_2= 15% SiC, C_2 = 725^{0}C pouring temperature and D_1 = 10 minutes of stirring time). Maximum compressive strength for optimum condition is 9410.06 MPa.

d) Particle sizes of SiC is the most significant factor that influence the density of Al-Cu-SiC_p MMC. Other significant factors include stirring time, pouring

temperature and weight percentage. Optimum condition factors for the minimum density is $A_0B_1C_1D_1$ (A_0 = 40μm SiC, B_1 = 10% SiC, C_1= 700^{0}C, D_1 = 10 minutes stirring times). Minimum density at optimum condition is 2.6592 g/cm^3.

e) Al-Cu-SiC_p MMC with higher weight percentage of SiC exhibits higher hardness value.

f) Al-Cu-SiC_p MMC reinforced with higher weight percentage of SiC exhibits better wear resistance characteristic.

g) Al-Cu-SiC_p MMC with smaller SiC exhibits lower value of density.

h) Al-Cu-SiC_p MMC has lower hardness value compared to gray cast iron.

i) Al-Cu-SiC_p MMC may become alternative material of gray cast iron for disc brake development as its exhibit improved properties.

5.3 Suggestions

For future experimental works on this topic, the author would like to suggest the following recommendation.

a) The particle sizes of SiC ratio to be selected should be large enough in order to determine its effect to the properties (mechanical and physical) of Al-MMC. The effect of SiC particle sizes on properties of Al-MMC is difficult to be observed if the size ratio is small.

b) Metallic mould should be used instead of sand mould to produced the testing specimen. Specimen cast in metallic mould would exhibits better surface finish and near to net shape compared to sand mould.

c) Reinforcement should be pre-heated before added into the molten matrix. The fluidity of molten matrix will change tremendously if there is no pre-heat

process performed on the reinforcements. The decreasing of fluidity is mainly due to the increasing of viscosity of molten matrix (Hashim, 2003). All these will affect the distribution of reinforcements in the molten matrix.

d) Lower the height of pouring to ensure that the air/gas entrapment during the pouring is minimized.

e) More replications should be done in order to minimize the noise factors.

h) Speed of stirrer should minimized in order to lower the entrapment of air and impurities. Vigorously stirring will entrap gas and impurities into the molten matrix.

i) Other testing such as toughness, thermal conductivity and tensile should be conducted A reliable brake disc should posses better characteristic on these properties

j) Heat treatment should be carried out on the cast MMC to investigate the effect on the mechanical and physical properties of Al-MMC.

k) Surface hardening treatment should be introduced to Al-MMC in order to increase its hardness.