CHAPTER 7

MAJOR CONCLUSIONS

The primary findings of the current investigation are as follows.

1) Cu-Gr-B_4C reinforced hybrid composites exhibit enhanced hardness relative to Cu-Gr-SiC reinforced hybrid composites. The (CU03) specimen has the highest hardness value (98.7HV) among all prepared specimens. The enhancement in hardness of the synthesized composites results from the use of boron carbide (B_4C), which is inherently harder (the third hardest material available) than silicon carbide (SiC). Furthermore, the development of B_2O_3 oxide within the matrix acts as a protective layer, significantly reducing wear.
2) The specimen (CU04) hybrid composite, with its low friction coefficient and excellent wear resistance, is ideal for use as a carbon bushing and bearing material in dry conditions. It is strengthened with 9 wt.% of boron carbide (B_4C) and graphite particles.
3) Cu-Gr-B4C and Cu-Gr-SiC reinforced copper hybrid composites show an increase in wear rate and coefficient of friction with increasing sliding velocity and normal applied load.

FUTURE SCOPE

The current work investigates the tribological characteristics of copper-based hybrid composites that combine a hard-phase boron carbide(B_4C) and solid lubricants such as graphite. There are many opportunities to investigate h-BN and molybdenum disulfide ($MoS_{2)}$ as the lubricating phase for different sliding conditions and applications. Therefore, more research into the friction and wear behaviour of h-BN and MoS_2-reinforced copper-based composites can be done in the future.

1) The stir-casting technology can be used to produce copper-based hybrid composites. A detailed investigation can be conducted to compare hybrid composites' physical, microstructural, mechanical, and tribological characteristics.
2) Nickel (Ni) metal coatings can be applied to graphite and boron carbide exteriors to improve their wettability and copper interface adhesion.
3) An analysis of the corrosion behaviour of copper hybrid composites can be conducted in subsequent years.
4) Various compaction processes, including as hot compaction and advanced sintering technologies, like spark plasma sintering (SPS) and microwave sintering, can be used to make composites to enhance their qualities.