Chapter 8

Concluding Remarks

The main objective of this work was to do comparative study of tribological behaviour of carbon-carbon (C/C) and carbon-carbon-silicon carbide composites under dry, brake oil, and freezing environment. The effect of normal load and sliding velocity were also investigated. Two sliding configurations were considered i.e. unidirectional and reciprocating sliding. Laminate orientation and surface conformity were also varied. To vary the laminate orientation, composites laminates were considered parallel and normal to the counterface. To vary the surface conformity, low conformity contacts (pin on disk arrangement) and non-conformal hertzian contacts (ball on disk arrangement) were considered. Following conclusions were drawn from the present study.

1. Formation of friction film is difficult in case of brake oil environment due to mixing of oil with the wear debris. Brake oil prevented the adhesion of wear debris to the contact surfaces. Friction film was significantly observed in dry and freezing environment.
2. C/C composites showed great sensitivity to the change in environment as compared to the C/C-SiC composites.
3. The friction coefficient in case of unidirectional sliding was more as compared to reciprocating sliding in all the three environments for low conformity contacts. For non-conformal hertzian contacts, there w no general trend.
4. C/C composites gained more weight in brake oil as compared to C/C-SiC composites.
5. The stability of friction coefficient changed with the orientation of laminates i.e., different orientation of laminates yielded different fluctuations in friction coefficient.

6. Cracks due to repeated flexion were observed in case of reciprocating sliding which were absent in case of unidirectional sliding.
7. Wear loss in case of unidirectional sliding was more as compared to reciprocating sliding for all the three environments in case of non-conformal hertzian contacts.
8. Cracks parallel to the laminates were observed when the composites were tested with normal orientation of laminates.
9. In case of unidirectional sliding, friction coefficient was highest for freezing environment in low conformity contacts whereas friction coefficient for dry environment was highest in case of reciprocating sliding.
10. Wear loss was highest for dry environment in the case of reciprocating sliding for low conformity contacts.
11. Wear loss was lowest for freezing conditions in case of unidirectional sliding.
12. An oxide layer was observed on the surface of the composites which were kept in the freezing environment.
13. Normal load and sliding velocity affected the sliding behaviour of C/C and C/C-SiC composites but the trend for every medium and load sliding condition was different. So, it was difficult to generalize the trend.