CHAPTER 5: CONCLUSIONS AND SUGGESTION FOR FUTURE WORK

5.1 Conclusions

Based on the experimental observations and discussion, the following important conclusions can be drawn:

1. L_n and L_w showed a decrement as fibre loading increase due to fibre-fibre, fibre-matrix and fibre-machinery interaction during material processing.
2. The addition of glass fibre (2 to 16% V_f), increased the decomposition temperature and the thermal stability of the system. However, the thermal degradation of SGF/PA6 composites reduced in the presence of moisture.
3. The existence of glass fibre and moisture reduces the degree of crystallinity significantly. Nevertheless, the presence of glass fibre does not influence the melting and crystalline temperature of composites.
4. From DMA experiments, the presence of glass fibre does not significantly influence the glass transition temperature, T_g of SGF/PA6 composite. However, the presence of moisture reduces the T_g significantly.
5. Increasing glass fibre content leads to higher value of tensile strength and modulus, whereas the strain at break increased for DAM and 50% RH specimens. However, exposure to moisture results in significant drops in tensile strength and tensile modulus but increased fracture strain due to degradation of the fibre-matrix interface.
6. In SGF/PA6 composites, the strain rate increase results in a higher tensile strength and tensile modulus but lower fracture strain. On the other hand, long travel extensometer shows higher extension for all tensile strength and tensile modulus of SGF/PA6 composites compared to short travel extensometer due to inertia effect.

7. Impact testing showed an increment in fracture energy, peak load, G_c and K_c with increasing in support span geometry, impact velocities, impact load and testing temperatures. In addition, notching the SGF/PA6 specimens has greatly reduced impact performance.
8. For tensile specimen expose to moisture, specimens in wet condition showed ductile behaviour compared to DAM specimen. On the other hand, composites subjected to high strain rate tend to fail in brittle manner and compared to composites tested at low strain rate. On the other hand, impact specimen tested at and above T_g composites fail in ductile manner. Nevertheless, below T_g composites fail in brittle manner.

5.2 Suggestions for Further Work

There are many aspects in this injection moulded SGF/PA6 composite could be further investigated. Some suggestions and recommendations on future study are as follows:

1. Addition of nano filler size as reinforcement to PA6 in order to improve the mechanical properties and thermal stability of the composite as compared to micro sized fillers.
2. Modification in the tup geometry from V-shape to hemispherical tups and investigates how far it will affect impact properties. Impactor shape has a significant effect on the failure mechanism and energy dissipation capacity of the specimen.
3. Investigate the effect of ultraviolet radiation on mechanical properties of SGF/PA6 composites through UV conditioning chamber.