CHAPTER V
CONCLUSION AND RECOMMENDATION

5.1 Conclusions

1. This study obtained several welding parameters referring to the friction time variations at room temperature and pre-heating temperature variations at an optimal friction time between pure zinc (Zn) and stainless steel 316L, including the optimal friction time of 35 s, the optimal friction pressure of ±3.0 MPa, and the optimal forging pressure of ±4.5 MPa with a friction welding machine rotation speed of 1445 rpm.
2. The tensile strength of welded specimens with friction time variations at room temperature decreases as the friction time variations increase. The average tensile strengths are 53.927 MPa (at 35 s), 47.220 MPa (at 40 s), and 44.590 MPa (at 45 s), respectively. The tensile strength of welded specimens with pre-heating variations at an optimal friction time (35 s) also decreases as the pre-heating temperature variations increase. The average tensile strengths are 59.700 MPa (at 100 °C), 42.803 MPa (at 150 °C), and 27.770 MPa (at 200 °C), respectively. It is still quite low when compared with the tensile strength of base materials. And the bending strength of welded specimens with optimal friction time (35 s) at room temperature is lower than the base materials. The average bending strengths are 9.865 MPa (at 35 s), 42.030 MPa (for base pure zinc material), and 279.735 MPa (for base stainless steel 316L material), respectively. It showed that the friction welding between pure zinc (Zn) and stainless steel 316L was done perfectly, but there was no intermetallic bond at the welded joint. This indicates that it is still necessary to carry out other variations in the test to get a better output value so that, in the future, this material can meet the benefits to be achieved.

5.2 Recommendations

1. A flow control system needs to be used in a hydraulic press to keep friction pressure and forging pressure constant.
2. To avoid oxidation, friction welding needs to be attempted in a vacuum environment.