CHAPTER V

CONCLUSION

Hot tensile tests were carried out to investigate hot ductility behavior and critical temperature range (ΔT) between zero strength temperature (ZST) and zero ductility temperature (ZDT) of tool steel grades AISI L3 and O1. The test specimens solidified from melting at cooling rate of 0.5°C/s and 3°C/s to the test temperature in the range between liquidus and 900°C. The specimens were then strained to failure at strain rate of 2×10^{-3}/s and 2×10^{-2}/s. Quenching test was carried out in order to investigate the microstructure occurred during hot tensile test. The microstructure that appeared in quenched specimen was then identified with SEM-EDX. According to the results of this study, it can be concluded as follows.

1) The critical temperature range for tensile test at slow and fast cooling rate for both steel grade AISI L3 and O1 increased with increasing strain rate.

2) For steel grade AISI L3, tensile test at high and low strain rate of the specimen solidified at fast

cooling rate displayed the reduction of area value of 35-65% in the temperature range between 1250°C and 900°C. The hot ductility is markedly different in the temperature range between 1200°C and 900°C at slow cooling rate.

3) The precipitation of sulfide of manganese in the interdendritic region during solidification resulted in deterioration of hot ductility of steel grade AISI L3.

4) For steel grade AISI O1, tensile test at various strain rates of the specimen solidified at fast cooling rate displayed no different reduction of area value in the temperature range between 1100°C and 900°C. In contrast, the hot ductility is markedly different when tensile test at various strain rates within the same temperature range.

5) The formation of eutectic carbide of vanadium, tungsten and chromium is believed to reduce hot ductility for steel grade AISI O1.