

INTISARI

Aluminium AA 1100 merupakan salah satu jenis aluminium yang bersifat *non-heat treatable* yang berarti sifat mekanisnya tidak dapat di tingkatkan dengan perlakuan panas. Salah satu metode untuk meningkatkan sifat mekanis aluminium *non-heat treatable* adalah dengan *cold working*. Jenis *cold working* yang sering dilakukan untuk meningkatkan sifat mekanis ini diantaranya adalah pengerolan dingin (*cold rolling*). Namun demikian, keuletan dari material logam setelah dirol dingin turun. Perlakuan panas annealing telah dikenal sebagai salah satu perlakuan panas yang dapat meningkatkan keuletan dari logam yang telah dirol. Tujuan dari penelitian ini adalah untuk mengkaji pengaruh annealing terhadap struktur mikro, kekerasan dan sifat tarik dari aluminium AA 1100 hasil pengerolan dingin.

Plat aluminium AA 1100 mula-mula dirol dingin (*cold rolling*) dengan persentase pengurangan ketebalan 75%. Setelah di rol, spesimen kemudian di-*annealing* dengan variasi suhu 300, 350, dan 400°C. Kemudian spesimen diamati struktur mikronya menggunakan mikroskop optik dandi uji kekerasan serta uji tarik.

Hasil dari penelitian menunjukkan bahwa struktur mikro dari spesimen yang telah di rol memiliki butiran yang lebih pipih dan rapat, sedangkan setelah di *annealing* butiran menjadi lebih besar seiring dengan kenaikan temperatur *annealing*. Kekerasan dan kekuatan tarik meningkat setelah proses pengerolan dingin sedangkan keuletan turun. Spesimen dengan reduksi ketebalan 75% memiliki nilai kekerasan paling tinggi pada sisi longitudinal dengan nilai 73,45 HV. Kekuatan tarik paling tinggi juga ditemukan pada spesimen dengan reduksi ketebalan 75% yang di tarik ke arah penarikan *transverse direction* dengan nilai 178,85 MPa. Namun demikian, proses annealing telah mengakibatkan penurunan kekerasan dan kekuatan tarik sedangkan elongasi meningkat.

Kata kunci: aluminium AA 1100, *cold rolling*, *annealing*, struktur mikro, kekerasan, sifat tarik

ABSTRACT

AA 1100 aluminum is one of aluminum series which is categorized as non heat-treatable which mean that its mechanical properties cannot be enhanced by heat treatment. One of the method to enhance the mechanical properties of AA 1100 aluminum is *cold working*. One kind of *cold working* frequently that used to enhance the mechanical properties is coldrolling. However, the cold rolled aluminium alloy with non heat treatable has low ductility. Annealing has been well known as one of methods to improve the ductility of cold rolled aluminium. The objective of this work is to investigate the effect of annealing on the microstructure, hardness and tensile properties of AA 1100 aluminium after cold rolling.

In this experiment, AA 1100 aluminum plate was be subjected to coldrolling with the thickness reduction percentage of 75%. The cold rolled specimens were then subjected to annealing process with different annealing temperatures, namely 300, 350, and 400°C. After that, the specimens were observed the microstructure by using optic microscope and the mechanical properties were determined through hardness and tensile tests.

The result of this experiment shows that the microstructure of the rolled specimen was found to have more dense and elongated grain. On the other hand, the grain size of annealed specimen microstructure was increased with the increasing the annealing temperature. Hardness and tensile strength after cold rolling were increased but the ductility was decreased. Specimen with 75% thickness reduction has the highest hardness value at the longitudinal section of the specimen with value of 73.45 HV. Highest tensile strength was also achieved by specimen with 75% thickness reduction with straining direction to the transverse direction with the value of 178.85 MPa. It can be concluded that annealing process has led to decrease in hardness and tensile strength but the improved elongation.

Keywords: aluminium AA 1100, *cold rolling, annealing, micro structure, hardness, tensile properties*