

ABSTRAK

KARAKTERISTIK KEKERASAN DAN PEMBENTUKAN FASE AL-6061 UNTUK KOMPONEN PISTON MOTOR PADA VARIASI TEMPERATUR *AGING*

Penelitian ini bertujuan untuk mengetahui tingkat kekerasan paduan AL-6061 setelah proses perlakuan *precipitation hardening*. Proses *precipitation hardening* diawali dengan proses *solution heat treatment* AL-6061 pada suhu 450° C dan lama waktu penahanan 60 menit, dilanjutkan dengan pendinginan *quenching* menggunakan media pendingin air. Proses selanjutnya adalah *precipitation treatment*, yaitu pemanasan pada suhu menengah (*aging*) dengan beberapa variasi suhu. *Aging* (penuaan) dengan menaikkan kembali suhu paduan aluminium dinamakan sebagai *artificial aging*. Suhu penuaan buatan yang diterapkan sebesar 100° C dan 150° C dengan durasi waktu masing-masing selama 30 menit, 60 menit, dan 120 menit. Untuk mengetahui pengaruh variasi suhu *artificial aging* dan waktu penahanan terhadap nilai kekerasan AL-6061, maka pengujian kekerasan *Vickers* sebesar 5 kg dengan waktu penahanan indentasi selama 10 detik. Dari hasil pengujian diperoleh nilai kekerasan AL-6061 mengalami peningkatan, dengan nilai tertinggi adalah spesimen suhu *artificial aging* 100° C dengan waktu penahanan 30 menit diperoleh nilai kekerasan sebesar 45.08 HV. Sebagai tambahan pengamatan struktur mikro dilakukan untuk mengetahui mekanisme pengerasan dan fase yang terjadi pada AL-6061 akibat proses perlakuan *precipitation hardening* dengan variasi suhu penuaan buatan dan waktu penahanan.

Kata kunci: AL-6061, *artificial aging*, *precipitation hardening*, struktur mikro, *Vickers*

ABSTRACT***HARDNESS CHARACTERISTICS AND PHASE FORMATION OF AL-6061
FOR MOTOR PISTON COMPONENTS AT VARIOUS AGING
TEMPERATURES***

This study aims to determine the level of hardness of the AL-6061 alloy after the precipitation hardening treatment process. The precipitation hardening process begins with the solution heat treatment process of AL-6061 at a temperature of 450° C and a holding time of 60 minutes, followed by quenching cooling using water cooling media. The next process is precipitation treatment, which is heating at medium temperature (aging) with several temperature variations. Aging by raising the temperature of the aluminum alloy is referred to as artificial aging. The artificial aging temperature applied is 100°C and 150°C, with a duration of time of 30 minutes, 60 minutes, and 120 minutes, respectively. To determine the effect of artificial aging temperature variation and holding time on the hardness value of AL-6061, the Vickers hardness test was 5 kg with an identification holding time of 10 seconds. From the test results obtained, the hardness value of AL-6061 has increased, with the highest value in the artificial aging temperature specimen of 100°C with a holding time of 30 minutes and a hardness value of 45.08 HV. In addition, microstructure observations were made to determine the hardening mechanism and phases that occur in AL-6061 due to the precipitation hardening treatment process with variations in artificial aging temperature and holding time.

Keywords: *AL-6061, artificial aging, precipitation hardening, microstructure, Vickers*