INTISARI

Paduan aluminium silikon (Al–Si) digunakan luas pada industri otomotif karena ringan dan kuat. Penelitian ini bertujuan menganalisis pengaruh penambahan tembaga (*Cu*) sebesar 1%, 1,5%, dan 2% terhadap sifat mekanik paduan Al-Si. Spesimen dibuat melalui proses peleburan pada 800°C dan pengecoran pasir, kemudian diuji menggunakan analisis komposisi dengan *emission spectrometer*, uji impak *Charpy*, uji kekerasan Brinell, serta pengamatan struktur mikro.

Hasil penelitian menunjukkan peningkatan kadar Cu yang tidak mencapai target, yaitu hanya bertambah 0,07%, 0,40%, dan 0,64% dari kadar awal 1,12%. Nilai impak mengalami penurunan dari 7,94 J/cm² (tanpa Cu) menjadi 7,43 J/cm², 7,35 J/cm², dan 7,62 J/cm² pada penambahan Cu 1%, 1,5%, dan 2%. Sebaliknya, kekerasan Brinell meningkat dari 63,69 HB menjadi 69,23 HB pada Cu 1% dan 1,5%, serta mencapai nilai tertinggi 75,82 HB pada Cu 2%. Pengamatan struktur mikro menunjukkan terbentuknya fasa intermetalik Al_2Cu yang memperhalus struktur dan meningkatkan kekerasan, namun penambahan Cu berlebih cenderung menurunkan keuletan.

Kata kunci: Al–Si, Cu, paduan Al–Si–Cu, impak, kekerasan Brinell.

ABSTRACT

Aluminum silicon (Al–Si) alloys are widely used in the automotive industry due to their light weight and high strength. This study aims to analyze the effect of adding copper (Cu) at 1%, 1.5%, and 2% on the mechanical properties of Al–Si alloys. Specimens were produced through melting at 800°C followed by sand casting, and subsequently tested using chemical composition analysis with an emission spectrometer, Charpy impact testing, Brinell hardness testing, and microstructure observation.

The results show that the increase in Cu content did not reach the targeted values, with actual increments of only 0.07%, 0.40%, and 0.64% from the initial 1.12%. Impact strength decreased from 7.94 J/cm² (without Cu) to 7.43 J/cm², 7.35 J/cm², and 7.62 J/cm² for Cu additions of 1%, 1.5%, and 2%, respectively. In contrast, Brinell hardness increased from 63.69 HB to 69.23 HB for 1% and 1.5% Cu, and reached the highest value of 75.82 HB at 2% Cu. Microstructural observations revealed the formation of Al_2Cu intermetallic phases that refined the microstructure and enhanced hardness, although excessive Cu tended to reduce ductility.

Keywords: Al–Si, Cu, Al–Si–Cu *alloy*, *impact strength*, *Brinell hardness*.