Pengaruh penambahan aluminium terhadap karakteristik paduan cartridge brass hasil pengecoran gravitasi untuk aplikasi selongsong munisi = Effect of aluminum addition on the characteristic of cartridge brass alloy produced by gravity casting for bullet cartridge application

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Abstrak

ABSTRAK
Selongsong merupakan salah satu bagian penting pada munisi tempat dimana bubuk mesiu, primer, dan peluru. Material yang digunakan untuk fabrikasi selongsong adalah paduan Cu-28Zn atau cartridge brass. Selongsong munisi dibuat dengan beberapa proses diantaranya adalah pengecoran, canai, dan penarikan dalam. Sering terjadi retak dan robek pada tahap fabrikasi. Telah dilakukan beberapa penambahan unsur paduan, tetapi hasilnya belum optimal. Dibutuhkan unsur paduan untuk meningkatkan kekuatan paduan cartridge brass tanpa mengorbankan keuletan. Aluminium dipilih sebagai unsur paduan tersebut.

Pada penelitian ini, paduan cartridge brass dengan penambahan 1.9, 5.7, dan 6.2 wt. % Al dihasilkan dengan pengecoran gravitasi. Paduan tersebut kemudian dihomogenisasi pada 800 °C selama 2 jam. Karakterisasi material meliputi analisis struktur mikro menggunakan mikroskop optik dan Scanning Electron Microscope (SEM) - Energy Dispersive X-Ray (EDX), serta uji kekerasan Rockwell B, mikro Vickers, dan uji tarik.

Hasil pengujian menunjukkan bahwa penambahan Al meningkatkan sifat mekanis paduan Cu-28Zn. Kekerasan, kekuatan tarik, dan tegangan luluh meningkat, sedangkan nilai elongasi menurun seiring penambahan Al. Peningkatan sifat mekanis disebabkan penambahan unsur Al mempromosi fasa beta dan memfasilitasi fasa gama dengan penambahan berlebih. Secara keseluruhan fasa gama yang terbentuk meningkatkan sifat mekanis paduan dengan mekanisme penguatan dispersi.
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ABSTRACT
Cartridge case is an important part of bullet where the gun powder, primer, and bullet take place. Common material that is used to make cartridge case is Cu-28Zn alloy or known as cartridge brass. Cartridge case is made by some processes, that include casting, rolling, and deep drawing. Cracking and torning are often found in the fabricating process. Many kind of alloying elements were added in order to minimize those problems, but the results obtained are still unsatisfying. Another alloying element is needed that could improve the cartridge case without sacrificing the ductility. Aluminum is chosen to be thataforementioned alloying element.

In this research, cartridge brass alloy with addition of 1.9, 5.7, and 6.2 wt.%Al were fabricated by gravity die casting. To homogenize the composition, the alloy was heated at 800 °C for 2 hours. Material characterizations consisted ofmicrostructural analysis using optical microscope and Scanning Electron Microscope (SEM) - Energy Dispersive X-Ray (EDX), Rockwell B, Microvicker hardness testing, and tensile testing.

The result obtained shows that Al addition improved the mechanical properties of Cu-28Zn alloy. Hardness, tensile strength, and yield strength increased, but the elongation decreased due to addition of Al. Increasing of Al composition in Cu-28Zn promotes beta phase and facilitates gamma phase with excessive addition. Overall, the gamma phase enhances the mechanical properties of Cu-28Zn alloy with dispersion strengthening mechanism.